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Original Contributions.

THE RELATION OF SYSTEMIC DISEASES TO THE CONDITIONS OF THE ORAL CAVITY.

BY JAMES EDWARD POWER, D.M.D., PROVIDENCE, R. I. READ BEFORE THE SECTION ON STOMATOLOGY, AMERICAN MEDICAL ASSOCIATION, 1906, AND PUBLISHED BY COURTESY OF THE JOURNAL OF THE ASSOCIATION.

The importance of the study of pathology of the oral cavity in connection with the treatment of systemic diseases is obvious, and he who is ignorant of its teachings is not only unjust to his patients, but must be regarded as a hindrance to the progress of his profession.

We often hear the study of microorganisms referred to as the new or germ theory, and, unfortunately, not only by those who deal in glittering platitudes of which they are ignorant, but often by members of our own profession who make statements which cause us to feel that this most important part of their technical education has been neglected. The great Roman author, Varro, in his writings during the first century before Christ, called the attention of the world to the fact that some indefinable, invisible, living organisms were responsible for certain diseases and especially for those of an epidemic character. During the sixteenth century Leuwenhoek was able to observe, through the magnifying lens of the microscope, definite outlines of these microorganisms, and he gave a classification, the first and most important step in the scientific investigation of disease. The forms which this great scientist discovered at that time do not correspond to the forms which we find to-day. The whole world is glad to believe, however, that this error, if it may be called one, was due to the instrument and not to the man. Every effort that is being made to draw aside the curtains and to reveal the life history of these

microorganisms allows the light of science to shine more brightly and to illume the background whereon is the name of this Swiss naturalist, Leuwenhoek, the first investigator, whose successors are Pasteur, Raynaud, Lannelongue, Vulpius, Moriggia, Marchiafava, Sternberg, Klein, Miller and many others.

The Mouth as an Incubator.—We can easily understand if we familiarize ourselves with the fundamental principles of bacteriology that the mouth is an excellent incubator for the development of microorganisms, principally because it contains heat, moisture and oxygen, the conditions on which they thrive. It is true that many bacteria cannot live in the mouth on account of the variations of these conditions, but it is equally true that nearly all the pathogenic or death-producing microorganisms find in the mouth an environment which is perfectly suited for their habitation. Miller has isolated more than one hundred different specimens from the mouth.

Antiseptic Properties of the Saliva.—Many are under the impression that the saliva contains antiseptic properties and base their conclusions on the well-known fact that the mouth does not yield very readily to the ravages of infection. According to Miller and other investigators, the antiseptic properties of the saliva are so slight that they should not be considered in dealing with this problem. The reason that infection does not take place more frequently is that the mouth and its component parts have greater power of resistance than other portions of the body. The fact that so many kinds of bacteria do exist in the oral cavity is sufficient to satisfy the average student that the saliva does not contain the antiseptic properties which some are inclined to believe that it does. If this were so, then the bacteria would be destroyed.

Microorganisms Found in the Mouth.—In neglected mouths 1,140,000,000 cultivable microorganisms are found. The accumulation which is found between the teeth, on the shelves made by overhanging fillings, in the cavities of carious teeth, in the pockets made by malposed teeth, etc., is so mixed that it makes a most excellent medium for the growth of these microorganisms. Even in the average mouth each drop of saliva contains 4,375 microorganisms, among them being streptococci, staphylococci and diplococci. Flügge has demonstrated by his experiments that any

explosive action of the lips, such as the pronunciation of words commencing with D, K, P and T, will expel these virulent bacteria into the air. This is sufficient evidence, or at least should be, to make us pause a moment and ask ourselves whether or not the mouth of the children in our public schools should be subjected to frequent examinations.

It is impossible for me in this brief time to point out the far-reaching influences which these little messengers of disease and death can have whose home is the oral cavity. Not only are the antiseptic properties of the saliva of the individual overestimated, but the gastric juice is also regarded as the destroyer of any germs that may be swallowed. But Macfadyen, Sucksdorf, Miller, Baumgarten and others have demonstrated that the action of the gastric juices does not destroy the bacteria found in the mouth. Sucksdorf found an average of 380,000 cultivable bacteria in one milligram of fresh feces and that 30 per cent. of these bacteria were carried from the mouth to the anus.

According to the authorities, the only time that the gastric juice has the power of destroying bacteria is when digestion is most active, two or three hours after a meal. This, one can readily understand, is the time when these microorganisms from the oral cavity are least apt to be introduced, as most, if not all, the pathogenic organisms are carried in by the food when it passes through the mouth. Hence, it would be folly to argue that this is not also a great danger.

Of the many specimens of bacteria found in the mouth perhaps the most important are those of pathogenic type, such as diphtheria, typhoid, cholera, septicemia, pneumonia and others whose development and propagation cause in many instances a cessation of life.

Netter found that 10 per cent. of all mouths examined by him contained the *Staphylococcus pyogenes aureus* and *Staphylococcus pyogenes albus* and that the microorganisms of pneumonia were present in 15 per cent. of healthy mouths. Schriever tells us that 75 per cent. of apical abscesses examined by him contained the microorganisms of pneumonia, and Vulpian produced septicemia by inoculating animals with the saliva from healthy men.

From the observations and conclusions drawn from the study of diseases in our hospitals it has been proved that these micro-

organisms are the principal cause in nearly every disease known to modern medicine. The pathologic manifestations vary, however, and in some instances we may find that the inflammatory process involves only the first or hyperemic stage, and in others we find manifestations of the last, or suppurative stage. In the oral cavity under these conditions we find caries and necrosis of both the osseous and muscular tissues, while in other cases the kidneys, lungs, liver, intestines, and the valves of the heart, through the lymphatic glands become involved, and in other instances and by other avenues the brain becomes involved. Indeed, it is beyond the capacity of the human mind to determine just when these minute forms of life cease to invade, cease to change physiologic to pathologic conditions, health to disease, life to death.

According to credible authority, septicemia and pyemia cause the greatest number of deaths, secondary meningitis holds the second place, having been occasioned by the inflammatory process reaching the covering of the brain (pia mater).

When we consider these statements, which are all based on fact, and when we reflect on the conditions which are so favorable to the transmigration of bacteria, such as the highly vascular tissues, the saliva, the glands, etc., with which the mouth is so abundantly supplied, does it not seem strange that more attention is not given to this part of our economy as an etiologic factor in disease? Science has proved their existence; therefore, it devolves on us to take measures not only to destroy them, but to destroy all conditions which are conducive to their growth.

Inflammations During the First Dentition.—Perhaps the first and most common form of inflammation with which we have to deal is that which presents itself during the first dentition of the child. This is the result of pressure on the tissues caused by the tooth in trying to pass through the gum during the process of eruption. If you pause for one moment you can easily understand the processes which are taking place in the living tissues and which cause so much heat and pain. I have known of careless people who had charge of babies introducing all sorts of unclean substances into the mouths of these little sufferers during this period. It is needless to describe the effect the inflammatory condition has on the nervous system. Suffice to say that all sorts of

pathologic reactions in this system, including high temperature, diarrhea, and in many cases convulsions occur. Children have come under my observation suffering from the above described conditions, after having been treated by physicians with internal remedies, which in some instances afforded temporary relief, but in all cases a reaction followed which lessened the child's resisting capacity. A crucial incision through the tissues in the area through which the tooth was trying to pass caused permanent relief. A complete cure of a large number of convulsing children during the period of dentition, and especially during the summer months, causes me to bring this experience before this Section for discussion.

When we consider the number of unclean substances, such as soiled fingers, soiled linen, soiled hard-rubber rings, and unclean soft-rubber nipples, which are used on nursing bottles, we have ample reason to marvel that the mortality and sick list among these children are not greater. Along pathologic lines, it seems reasonable to assign many of the cases of inflammatory conditions of mothers' breasts to transmission by the infant.

Transmission of Disease by Mouth.—Now, transmission of disease by the mouth is encouraged to a large degree by the adult, and in the majority of cases it is due to ignorance; for example, in the common practice of moistening promiscuously the lead in pencils, without having previously known whether they were charged with specific bacteria or not. In other instances, infection may take place when the subject may be innocent.

Miller reports an instance where several boys were inoculated with syphilis, after having been tattooed by a syphilitic, who moistened the needle used for the purpose before breaking the skin of the victim.

In one of the Russian provinces all the natives believe that any and all inflammatory conditions of the eye are due to the lodgment of foreign bodies, and the method adopted is to place the tongue between the lids of the eye to remove it. Some have become so skilled in this line that they make a specialty of treating eyes in this way. Acting in this capacity, one woman inoculated 6.5 per cent of the entire population of the province of Wiatka with syphilis.

Bacteria of the Mouth.—Netter, Schriever and other scientific investigators have demonstrated that the dental pulp is a source of almost unlimited infection of the vital parts of our system. For instance, as a sequel of this condition we observe necrosis, diseases of the sinuses, infection of the glands of the neck, gastric disturbances and many others which time will not permit me to mention.

Miller found organisms of pyorrhea alveolaris, which he called *Micrococci gingivæ pyogenes,* virulent in character. Injections through the skin of mice caused inflammation of the part followed by an abscess, which finally resulted in the death of the animal. Introduction of this organism into the abdomen of the mice causes death from peritonitis within twenty-four hours, the autopsy showing large numbers in the abdominal cavity.

Bacterium gingivæ pyogenes is another form of microorganism which is generally found in the mouth of a person affected with pyorrhea, as well as in the substances of a suppurating tooth pulp, and when injected into the abdomen of white mice will cause death in from ten to twelve hours. The animal's eyes seemed glued together and the spinal column was bent almost like a bow, resembling the conditions of strychnin poisoning. Autopsy showed death from peritonitis.

Bacillus pulpæ pyogenes is still another form of animal life which is found in putrescent pulp, and which, when injected into the abdominal cavity of white mice, produces death in from eighteen to thirty hours.

Another organism found on the superficial layers of carious dentin, called *Bacillus dentatis viridans*, when injected into the skin caused severe inflammation and in one case death from blood poisoning. When injected into the abdomen of white mice death from peritonitis ensued in 60 per cent of the cases in from twenty-two hours to six days. In these cases the organisms could not be found in the blood microscopically, but cultures made from the blood of the heart developed the bacteria injected.

I call your attention to the action of the microorganisms, not to have you believe that they will produce like results in the human system, but that their action is the same, only the great resistance of our systems compared with that of mice prevents death, but the resistance is not sufficiently able to prevent an inter-

ference with the functions of the organs, therefore we have diseases of other parts, which we can reasonably attribute to the presence of these organisms in the oral cavity.

Deaths Following Infections of the Mouth.—During the sixteenth century Vulpius in his writings states that disfiguration and death are the result of toothache, and reports the death of Gosvin Halt, the Amsterdam physician, who had his gum lanced to allow the eruption of a molar tooth. Subsequently the gum became swollen, insomnia and delirium followed, and finally death relieved him of his sufferings. This condition is what we would probably call to-day septicemia, due either to microorganisms being introduced into the system from unclean instruments, or that the instruments made an avenue through which the microorganisms, already present in the mouth, entered the system.

Zakhavevitsch reports the death of two healthy physicians, one from osteomyelitis, six days after the extraction of a left inferior second molar and another from peritonitis and osteitis. The first stage in the process of each disease was also conclusive evidence that infection was caused by unclean instruments. Banner reports many cases, among them being one of especial interest, that of a young student, 24 years old, who made a visit to a physician for the purpose of having a molar tooth extracted. The physician broke the tooth in the attempt and during the next twenty-four hours swelling ensued. Finally the periosteum became involved and necrosis followed. The necrotic area was removed fourteen days after; swelling continued, there were chills, great debility, rapid and marked excursions of temperature, pyemia, and finally the right lung became involved with pus and patient died.

Delester reports several cases in which the inflammatory process spread to the brain and the patient died from meningitis.

The following case reports may be of some interest:

CASE I.—On December 4, 1905, C. N., a girl, aged 7, was referred to me by her physician. She was suffering from neuralgia involving the right side of the head, inability to sleep, loss of appetite, etc.

History.—On November 30, 1905, she came home from school complaining of headache, with slight swelling of the right side of the face. Dr. H. was called and found the child with a temperature of 105 degrees F. and other symptoms which would

suggest that she was in the first stages of some one of the exanthematous diseases. He prescribed and visited the child on the next day, expecting to find his diagnosis verified, but on the contrary the swelling had increased somewhat, with a drop of 2 degrees in the temperature. Examination of the throat revealed nothing to the experienced eye of this physician. He continued to visit the child for the next five days, keeping her as comfortable as possible, but was unable to diminish the temperature more than 1 degree. Temperature remained 102 degrees during this time.

Examination.—When I saw her she had a temperature of 102 degrees F., with the other symptoms previously described. Her mouth seemed to be in a healthy condition, with the exception of two or three badly decayed teeth, scattered about the mouth. The child could not give the exact location of pain. On the superior right maxilla all the teeth were present, including a newly erupted sixth year molar, which was apparently healthy so far as visual and instrumental examination could determine. Anterior to this was the second temporary molar, decayed, although the decay did not involve the pulp. The condition was such as one generally sees in the mouths of children when the decay seems to have stopped, not unlike the teeth of tobacco chewers. There was no pain associated with the examination of the decayed tooth, not even on pressure. There was, however, slight pain, when percussion was used on the permanent molar.

Treatment.—I finally decided to extract the permanent tooth, to the great disappointment of the parents, who thought that if any tooth should be extracted it should be the decayed one. Examination of the permanent molar showed unmistakable signs that my diagnosis was correct. Abscesses about the size of small peas were found at the ends of the roots. All other parts of the tooth were normal, having no cavity, not even the small fissure cavity that is present in nearly all first permanent molars. The child made a rapid recovery; her temperature became normal within twenty-four hours.

Since physicians are the ones who are generally called to see such cases, I am going to report one of many cases which I hope will show how important are the lower third molars, or what are commonly called the wisdom teeth, as factors in causing disease.

CASE 2.—On April 9, 1906, L. M. manifested the following

symptoms: Severe neuralgia pains, loss of appetite, sleeplessness caused by the pain, finally swelling of the right side of the face, sore throat, and interference with the motion of the jaw, followed by fever and chills. On the second day a physician was called who evidently decided that the patient had some tonsilar affection. He increased the man's suffering by making an incision through one of the tonsils. After three days the patient discharged this physician and called in another, who found him with the described conditions increased and a temperature of 104 degrees. He immediately had the man transferred to a private hospital, where, on examination, he found an inferior third molar badly decayed, which he immediately extracted without breaking, this being followed by a large amount of pus. The patient experienced relief and temperature dropped to 102 degrees. The physician prescribed mouth washes. This was on Thursday, April 6, and the man's condition remained about the same, face swollen, etc., until 3 o'clock in the morning of April 9, when patient was attacked by chills, followed by a rise in temperature of two degrees. I reached the hospital at 2 p. m.

Examination.—The face was badly swollen, the swelling involving the sublingual and submaxillary glands, neck, temporal region and ear. The patient was unable to open his mouth and was suffering intense pain. The tissues were swollen to such an extent that they were very hard and it was impossible to get fluctuation. An incision had been made near the angle of the inferior maxilla internally before I arrived, but nothing but blood came from the wound. I introduced a probe into the socket from whence the tooth had been extracted, but was unable to get any pus.

Treatment.—I advised immediate operation and the patient was etherized. The mouth was forced open with a mouth prop, then with a periosteal dissector I freed the muscles from the bone extending from the angle to the first molar tooth and down to the inferior border of the bone. The pus, which was deep-seated, now began to evacuate itself, until about four ounces were produced. I then curetted the tissues forming the inside of the cavity, which was as large as a hen's egg, washed it thoroughly with a weak antiseptic solution, and packed the cavity with sterilized gauze. I dressed the wound each day, and at the end of three days referred

the patient back to his attending physician, under whose care he made a full recovery.

Glandular Swellings.—Swelling of the lymphatic glands of the neck is one of the diseases which, according to the observations of Odenthal, may be traced directly to conditions of the oral cavity. Odenthal examined 987 children and found carious teeth in 429; in the remaining 558 no decayed teeth were present, and in 275 cases or 49 per cent there were glandular swellings. Of the 429 children with decayed teeth, glandular swellings were present in 424 cases or 99 per cent.

In his examinations he also established a direct relation between the extent of decay and the area of involved glands. For instance, when decay was very much marked, the glands were much swollen, when decay existed on both sides glandular swelling existed on both sides, also.

Involvement of Heart.—Inflammation of the valves of the heart, which generally follows pneumonia, can be traced without question to conditions of the oral cavity. We find the pneumococci present in cultures taken from the affected areas of the heart, after this disease has been present, and we find them in the mouth before and during the period that the person is afflicted. Therefore under these circumstances our conclusions are fair.

Many members of the medical profession, including such eminent authorities as Dr. John H. Musser of Philadelphia, consider mouth sterilization, so far as it can be done, one of the progressive steps in the treatment of pneumonia. Musser's first step is to place fifteen grains of calomel on the back of the tongue of the patient.

Relation of Mouth Infections to Pulmonary Tuberculosis.—Leydon, Jaffe and James Israel demonstrated by their experiments that tuberculosis of the lungs may be traced directly to microorganisms found in the mouth. Leydon and Jaffe, in postmortem examinations of the lungs of an individual affected by putrid bronchitis, or gangrene of the lungs, showed that the microorganisms were identical with those found in the mouth. Israel also found a small irregular body in the lung of a patient affected by primary actinomycotic infections, which on examination proved to be a salivary calculus containing bacteria which had been inspired into the lung, causing death.

Miller reports the case of a woman of 50, who was afflicted

with a long-standing insufficiency of the aorta, but otherwise in good health and enjoying a vigorous digestion. After a heavy sorrow she began to lose her appetite and complained of cardialgia which set in after every meal. She was put on slight liquid nourishment, and finally was compelled to restrict herself to tea. Repeated course of treatment with Carlsbad water brought but temporary relief. Mouth examination revealed swelling and slight ulceration of the gums; besides this, the tongue was heavily coated and the posterior wall of the pharynx somewhat inflamed. Frequent syringing of the oral cavity and pharynx and also with the iodin-myrrh tincture produced a cure in a few days, but if the patient neglected to cleanse her mouth but a single day, the old trouble would return. Miller has watched the relation between unclean mouths with swollen and inflamed gums and disorders of the stomach for many years.

A case has been reported in which a man of 50 who had always been well, suddenly became troubled by inflation of the stomach and swelling of the liver. A cure was effected by the removal of an artificial upper denture which had not been taken from his mouth, not even to be cleaned, for a period of two years.

While I have treated similar cases, I selected these of authorities, such as the men mentioned in this paper, because of the high regard which both the dental and medical professions have for their careful and scientific investigations, and I am sure these cases will have a greater influence on your future observations than any number of cases which an embryonic member of the dental profession like myself could report.

After listening to these statements, which are all based on fact, and remembering that the scientist does not accept a fact until, after having a definite theory, he has taken every means to prove that his theory is wrong, we are bound as professional men to respect his records.

Therefore, it is perhaps within my rights as a dentist to call the attention of the operating surgeon to mouth sterilization by himself, to the abolition of conversation and especially of talking into the wound during a laparotomy, as a measure toward the prevention of sepsis. The surgeon should also order sterilization of the patient's mouth before the anesthetic is given as a preventative measure against the patient drawing polluted saliva or parti-

cles of calculus, such as I have described, into the lungs, thus preventing post-operative pneumonia.

In nearly every pathologic condition there are inflammatory symptoms which may vary from simple hyperemia to complete destruction of the part, therefore, while all conditions of oral pathology do not manifest themselves or terminate as those described, still we must admit that it is rather a question of their development than of their presence.

DISCUSSION.—*Dr. Vida Latham,* Chicago: I hope that the doctor will not eliminate all bacteria, because we need some special bacteria to take care of the mouth and to build up immunity and resistance to some diseases of the oral apparatus, as well as to aid in processes of digestion and oxidation.

Dr. M. I. Schamberg, Philadelphia: The essayist's observations have been the same as those of a number of other physicians. The more I hear such papers the more I believe that in dentistry we are often dealing with conditions in the mouth that encourage diseases, which may otherwise run a fatal course. Dentists have a greater mission in the prevention of such fatal diseases than those who treat the diseases after they have once placed patients in a moribund state. I feel proud of the work that the dental profession is doing, especially the Section on Stomatology, in combining with medical men to show the tremendous amount of good dentistry works in the entire human body.

Dr. J. E. Power, closing discussion: The fact that we need more bacteria in the mouth is recognized. I referred, principally, to the disease-producing bacteria, and think of the two, we can, perhaps, get on better without these bacteria than the class to which Dr. Latham referred.

THE USE OF THE PYROMETER IN FUSING PORCELAIN.

BY R. M. PELTON, D.D.S., DETROIT, MICH. READ BEFORE THE MICHIGAN STATE DENTAL ASSOCIATION, AT DETROIT, JULY 10, 1906.

The purpose of this paper is to endeavor to make clear the proper use and application of a pyrometer in the fusing of porcelain.

It might be supposed that all that is necessary, aside from the

ordinary knowledge of porcelain work, is to connect the pyrometer to the furnace and proceed to make tests upon the various bodies that are to be used, observing the length of time taken and the degree of heat to which the needle points when the desired result is obtained, making a note of it mentally, or otherwise, for future guidance, and ever afterward proceed in the same manner.

These might prove ample directions in the case of a steady voltage, but the fact is that current strength varies in some localities, and this variation causes trouble under any system which may be adopted for the fusing of porcelain. For this reason, a further consideration of the subject is necessary to thoroughly understand it and to enable the operator to account for certain phenomena which he will observe when using a pyrometer on a fluctuating current. Phenomena which at first may not be understood will most likely be attributed to causes other than the real one.

To comprehend the subject and all its phases it will be necessary to consider some phenomena about porcelain that have not long been observed, or of which, at least, nothing was said until the matter was taken up by Dr. John Q. Byram, of Indianapolis, in a very instructive and interesting paper, read before the Chicago Odontographic Society, November 21, 1905. The statements made by the doctor at that time were based upon a series of very thorough experiments and the results he obtained have been verified by others. Some of the deductions from these experiments are as follows:

1st. That porcelain has no definite fusing point when separated from the consideration of time.

2d. The longer the time of exposure to heat of any porcelain the lower the temperature at which it will fuse. To quote Dr. Byram exactly, "By prolonging the time of exposure to heat, a thoroughly fused porcelain may be obtained at a comparatively low temperature."

3d. That low fusing porcelain may be obtained by repeated fusing and grinding of high fusing porcelain.

4th. If a piece of porcelain be fused perfectly and then more of the same porcelain be added and the whole mass carried to exactly the same point, the first layer will be overfused because it has had a longer exposure to the same heat. If a third layer

be added, and fused perfectly, the second will be overfused and the first still more so, and the colors bleached. In making this test layers may be added and the heat carried to the exact fusing point of the last layer until by this repetition the first is absolutely ruined. In other words, if porcelain be kept long enough in the maximum heat required for its fusing it will become just a globule of glass.

This quality of porcelain, which admits of its fusion at a comparatively low temperature by long exposure, is so pronounced that those which ordinarily fuse at from about 2100 to 2550 degrees, when brought to the required temperature rapidly, may be fused on pure gold by giving them sufficient time. Pure gold fuses at a trifle under 1950 degrees, and Dr. Byram's experiments show that Brewster's enamel could be properly fused on it in from fifteen to forty-five minutes, the difference in time depending upon the amount of heat applied. Brewster's foundation, Justi's and Close's body require from thirty minutes to one hour and fifteen minutes. Brewster's crown and bridge, S. S. White's inlay, and Whitely's inlay porcelains require from one to three hours, while the Consolidated Co.'s high fusing inlay porcelain requires from six to eight hours to fuse on pure gold.

From the foregoing we see that by repeated heating of porcelain to, say, the point of biscuiting will, in a few heatings, produce a perfect fuse, or if porcelain be exposed to a certain degree of heat for a certain length of time, accurate and desired results will follow which will be known in advance by the operator who has made the necessary tests. Success depends upon time and temperature intelligently applied.

The time is easily disposed of, but what about the temperature? How are we to fuse at a definite degree of heat without some means for indicating it? Some may say we can judge by the color of the heat, but that method is unreliable, to say nothing of the terrible strain upon the eyes when using high fusing bodies. Another may say, leave the furnace running with the lever on No. 1 until the maximum heat is obtained on that button, and then always start from that and time the work on the other points used until the proper result is reached. This gives us a definite heat, although we do not know what degree it is. That may be true on a steady voltage, and we know an immense amount of the

most excellent work has been done with this method, but what about the dangers of a fluctuating current? In this case, if time only is depended upon to obtain correct results, the situation becomes at once serious when we consider the danger of running, perhaps, an important piece of work that has taken hours to bring to the point where it is ready for the furnace. Let us presume a case: Yesterday we obtained correct results by running the furnace, say, one-half minute on contacts Nos. 2, 3, 4 and 5, and two minutes on No. 6; to-day, we again ran the furnace in exactly the same manner, but obtained only a biscuit where yesterday a perfect fuse was the result. What is the meaning? As we all know, it means that to-day the voltage is weaker than it was yesterday, and we must test up again. Perhaps no harm is done in this case, but to-morrow, if we depend on the tests of to-day, it may be the voltage will be as strong or stronger than yesterday, and if we run the length of time indicated by our tests of to-day the case may be ruined and require to be done over again.

Under tests with the pyrometer if the current is uniformly the same day after day, the needle will always point to the same temperature upon running the same length of time. The results to porcelain will be the same with each fuse if, approximately, an equal amount of the powdered body be used, and the only responsibility involved is to decide upon the allowance to be made for the difference in amount of porcelain which would be necessary under any system of fusing, and to move the lever in the usual lengths of time on the intermediate contacts from No. 1 to that which is decided upon for the final result. The pyrometer may be relied upon, and it also serves another purpose of great value. It indicates when the desired point is reached and also enables the operator to readily observe any serious fluctuation of heat from that which should be produced under the steady voltage, for if from any cause the current should be either weaker or stronger than normal, the needle will soon denote the resulting variation in amount of heat by moving to a greater or lesser distance on the dial than is usual in the same length of time, and this change will instantly be noted, the cause of it understood, and the proper steps taken to avoid damage to the work.

The steps should be three in number and the decision as to the

proper one to take, and how far it should be carried, will be based upon experience.

Step No. 1.—If the needle indicated that heat was being generated more slowly than usual, the observing operator would know he must take a longer time for the fuse, and as the porcelain would thereby receive a longer exposure to heat, it would fuse at a lower temperature. Therefore, the needle would not be allowed to register so high as when the voltage and heat are normal.

Step No. 2.—On the other hand, if the needle indicated that heat was being generated more rapidly than usual he would know that if the lever be moved forward as usual the fuse will be reached in a shorter time, and as the exposure of the porcelain to heat is for a lesser time, the needle must be allowed to indicate a higher temperature than when the voltage and heat are normal.

Step No. 3.—If the operator observes that the needle is registering a greater or less amount of heat in a given time than usual, he may still hold his work to the normal conditions by moving the rheostat lever more rapidly or slowly, as required, to reach a given temperature in a given time. This step is very likely the best of all, and is a good argument in favor of a rheostat.

Some may think all this might not be noted, but it would be a mistake to suppose anything of the kind. It becomes second nature to the careful operator to be conscious of the doings of the needle and the degrees to which it should point in a given time. For instance, if we start with the normal heat obtained by leaving the furnace running on No. 1 contact, with the door open, and then close door and place lever on No. 2, remaining there thirty seconds, and the needle points to 1550 to-day at the end of that thirty seconds and to-morrow under apparently the same conditions the needle points to 1660 in the same length of time, the operator would be conscious of it and know that his current was stronger, and if he adopted the plan of regulating to the changed condition by use of the rheostat, he would advance the lever more slowly and hold the muffle to normal conditions.

The pyrometer needle will point to the same degree of heat every time when pure gold fuses, if the gold has the same bulk, and is in exactly the same temperature as the hot end of the Thermo-Couple every time the fuse is made, and this is regardless of the length of time taken.

Assuming that the instrument has been correctly calibrated, it will always give the correct temperature of the muffle. When heat is generated rapidly in a muffle, a short run will fuse the porcelain, but it will be at a comparatively high heat and the needle correctly indicates what degree it is.

On a comparatively low heat and the necessity of a long run the same porcelain will eventually fuse; it may be several hundred degrees lower, but the temperature will be registered by the pyrometer and it will be correctly reckoned from the fusing point of pure gold as the standard.

With this array of proven facts, unless what seems very improbable takes place and the nature of porcelain in reference to its fusing qualities is entirely changed, so that it approaches more nearly that of gold, it does not seem possible that any automatic device operated by the fusing of metals will ever be invented that can be relied upon to any extent to cut off the current at the proper time, while the operator busies himself with something else or closes up and leaves his office entirely.

Neither is it reasonable to suppose that any man can write names of the various porcelain bodies on the dial of a pyrometer and with any degree of certainty say that such a porcelain will fuse here and another there under the varying conditions of current such as are sure to be met with.

If a pyrometer be calibrated with the Thermo-Couple attached to a furnace which is heating on a 110-volt current, and after calibration a porcelain be fused, say at 2400 degrees, then attach the same outfit to a 120-volt current, the extra 10 volts will generate heat more rapidly and the porcelain be fused in a shorter time, therefore it must be in a higher heat. In this case it would be at least 100 degrees. Again, if the same outfit were attached to a 104-volt current the reverse would occur, and from the slowly generated heat and longer time the needle would point to a lower temperature than 2400. In the three cases the calibration would be the same, on gold with its definite fusing point, and in all three the heat indicated by the needle would be correct.

In most localities where the voltage is between 104 and 125 it is given as 110, but varies from that. Here in Detroit, in the downtown district and on the Edison current, the voltage is from 118 to 120 direct. In the power buildings, here and elsewhere,

where the current is generated in the buildings, there is usually considerable fluctuation on account of the varying loads to which it is subject. In a large portion of Detroit the current is 109 volts, alternating. These points are mentioned to show how difficult it is to lay down fixed rules, and to make more clear the necessity for each dentist to make his own tests on his own current and with the porcelain outfit he has elected to use. He can then write down fusing points as he finds them under conditions with which he soon becomes familiar.

There is something definite and tangible about a pyrometer—a something to rely on and give a name to. The time and degree can be thought about and talked about and the tests will be at once fixed in the mind in a way that is very gratifying and the operator is relieved from ever straining the eyes in attempting to look into the fierce heat of the muffle.

To the beginner in porcelain work who wishes to use a pyrometer, we would advise the fusing of porcelain buttons, making careful tests, and at the same time observing temperatures indicated by the needle and time occupied, making comparisons of color, bearing in mind that in proportion as the button is smaller the shade will be lighter than that of the shade guide. Do not try to obtain the maximum heat, supposed to be required, at first; rather get an underfuse and then work up to the correct results. Do not mistake the porous, burned out appearance of an overfuse for an underfuse, and then put a useless strain on your appliance trying to make it come out right. This very common mistake among beginners is entirely avoided by the use of the pyrometer, as they are given warning by the point to which the needle advances. With this system, as with any other, no practical case should be attempted without this preliminary testing, and these tests should include various kinds of work before attempting any for a patient.

If it is desired, and should your current prove to be very uniform, good results may be obtained by omitting to observe the time, and in its place moving the lever forward when the needle reaches a certain point, which is equivalent to timing, as experience has shown that the needle arrives at that point in a given time. The same holds true on the final point selected for the fuse in the case of a steady current, for it will be known that

when the needle indicates a certain degree of temperature it has arrived there in the usual time and the porcelain has been exposed to the exact heat for the proper length of time necessary for its fusing.

In using a pyrometer in connection with continuous gum work the fact is at once brought out that the fuse is obtained ordinarily at a much lower temperature than in small work, because a long time is usually taken to secure results. It is very likely the general belief that on a long run with the continuous gum furnace the fuse is finally obtained at the same degree of heat as a short run in the small furnace, but this is a mistake.

In Toronto last year I placed a button of Consolidated body in the furnace and closed the door with the lever on No. 1 contact. Just then I was called away, and was gone for a considerable length of time, and when I came back I took out the body, and, to my surprise, it was beautifully fused. I supposed then that the long run on No. 1 with the door closed had brought the temperature up to the fusing point of that body, which is given as 2550 degrees Fahr. I now know my mistake, for by the pyrometer I can show that under the conditions in which the furnace was working at the time it would be impossible to obtain over 2100 degrees with the door closed and the lever on No. 1, no matter how long it should be left. So I know *that* porcelain fused at 2100 degrees or less.

I have tried to bring out this point strongly because it will, perhaps, be the only one that may puzzle the man who takes up the pyrometer method. The fact exists and it was shown up when the pyrometer came into use and gave us a tangible method of indicating degrees of heat.

MALOCCLUSION OF THE TEETH AND ITS INTIMATE RELATIONS TO CARIOUS CONDITIONS,

BY F. E. WILLIAMS, D.D.S., KINGSLEY, MICH. READ BEFORE THE MICHIGAN STATE DENTAL ASSOCIATION, AT DETROIT, JULY 11, 1906.

In examining the cases coming under our immediate attention we are cognizant, and more or less concerned, that patients who are quite young (from six years old even to adult age), are af-

fected with diseased conditions of the mouth, and while carious teeth are the rule and are to be expected, we find still other conditions common and arising from the same cause. We expect and are looking for tooth decay more in the child than the adult, with whom the tooth structure and all the tissues have attained their best condition, or should have if not too much handicapped by disease, and are, therefore, in a position to better combat disease, having preserved their strength. Surplus vitality having been stored up may be used when needed for repair of tissues, but not as growth.

We, in our position, are in duty bound to make conditions as we find them as normal as possible, for the strength of the adult organism is immediately dependent upon the perfection of its structure.

Now, in the beginning, where shall we start? We may not wait to see what nature will do for us in the future, but we can see that she is doing her best under prevailing conditions, trying to get away from the irritation by absorption and to overcome it by excessive building of new structure, new tissue. Then our beginning should be with the origin of the pathogenic tendency, for at that time we can do the most good. The embryonic structure is at its best and responds more readily to treatment, for, being in the growing stage, the length of treatment is necessarily much shorter.

Malocclusion is a prime mover in carious conditions of the mouth. The teeth are out of position, that is, are not in proper occlusion. They are protruding, bunched (which is classified as retruding), and turned, and the fact of their being in such malpositions is sufficient to bring the contiguous membrane into an abnormal condition.

The dental ligaments are not in proper condition or position. They are stretched around the teeth in different positions, causing obstructions to the circulation by continual tension on the blood vessels, also hindering the elimination of waste products, as well as the bringing of nourishment to these tissues. Under such conditions the gums look thick, the circulation being sluggish, as is shown by their dark appearance. They may be swollen and standing away from the teeth, giving an unsightly appearance, impossible to keep clean as they should be, and a case where no amount

of treatment, prophylactic or otherwise, could materially remedy the condition.

This condition is found in all cases except where the teeth are regularly protruding, and rather than there being too much gum tissue, there is not enough, for it is in a stretched condition and may be seen in any individual disarrangement of the teeth. The muscular fibers and all the tissues are less than their normal amount in bulk and respond more readily to irritants while in this condition. There is no retention of food particles, as there are no retaining spaces, but the gums recede and there is decided retention owing to the shoulder of process and gums resulting. In other conditions the gums are loose and a great factor in the retention of food particles around the teeth. These pockets make it impossible to keep the teeth clean and greatly enhance the chances of decay, and, later, form the advance agents of hypertrophy and deposits on the teeth, resulting in inflammation of the gums and peridental membrane, recession of the gums and pyorrhea with ultimate loss of teeth.

Children do not take as good a care of their teeth as they do in later life, but many try their best to keep their mouths in a cleanly condition and yet fail, because it is more difficult on account of mouth breathing and malocclusion. It is noticeable that the portion of the mouth where the teeth are regular will be in good condition and with much less care. In regular dentures the festoons of the gums hug the teeth closely, not allowing the retention of food except at the approximal spaces; these, however, may be cleaned easily, because the surfaces of the teeth are in a high state of polish and all have a gradual slope.

Where the teeth are irregular the surfaces are more or less roughened, caused from contact with food retained and its action; also the retained constituents of the saliva. The food residue remains against the teeth continually, and from this contact and the chemical action from fermentation the enamel is acted upon and becomes roughened and after a time breaks down. The gums and process recede, diseased conditions set in and these result, sooner or later, in the loss of the affected teeth, sacrificed by what amounts to carelessness and neglect.

Perhaps the most frequent place we notice the foregoing condition is in the lower incisor teeth. They are, because of their loca-

tion and position, peculiarly liable to these conditions; also, because of the shape and size of their roots and their frail supporting tissues, we find them peculiarly liable to every trouble except decay. We also notice this condition of the gums in many other teeth, according to their location and degree of malocclusion. The cuspid teeth are many times protruding or too prominent and in this condition respond readily to irritation, the gums and process receding according to the degree of irritation, showing a large portion of the tooth, and becoming very sensitive at times to thermal changes and to the touch. On the other hand, the tooth being in lingual occlusion, or the teeth approximating it being in buccal or labial occlusion, food is retained and we are liable to lose the tooth entirely by pyorrhea or death of the peridental membrane, if the case is not corrected. Furthermore, the food is the more readily retained after absorption has begun and proceeds more rapidly. The enamel, having a hard, smooth surface, is not attacked so easily, but the dentin on exposure presents a roughened surface which aids greatly in retaining anything coming in contact with it, for it is exposed to atmospheric conditions instead of being covered by the process and peridental membrane and gums as in a normal condition. Contact with food, and not having the smooth surface of the enamel to protect it, a good surface for the lodgment of food and attack of decay is provided, which is also very hard to clean. In these conditions special care must be taken, for the gums are receding and the added irritation in extra cleaning is sufficient for the further receding of gum tissue and the absorption of process.

In the case of children, not only is food the more readily retained, but we have actual loss of tissue while it is in a growing stage. We should have, instead, added strength and vitality, the better to withstand attacks of disease in after life. The strength, however, is undermined in youth—leaving the tissue in a weakened state and unable to contend with abnormal conditions; hence, it soon succumbs to disease and destruction.

We see these conditions in the little folks, who are too young for the disease of later life, at a time when the mouth should be in fine condition, even without the intelligent use of the tooth brush.

These tendencies do not end here, for the food held in con-

tact with the teeth gives the very best conditions for the operation of the germs of decay, and we have destruction of tooth structure as well as the gums and process. We have the germs of decay already in the mouth at an extremely early age, ready to attack the new structures at any and all times.

Absorption may be going on when the tissues should be growing and improving, while more pockets may be forming for the retention of carious masses and added roughened surfaces along the teeth for the attack. Because of the malocclusion mastication also is faulty and this lessens the degree of perfection in mastication, thereby lowering the general vitality of the system, and causing abnormal conditions of the mucous membrane of the mouth and the alimentary tract. When the patient breathes through the mouth, the mucous membrane becomes dry and irritated by the constant passage of air. The surfaces of the teeth becoming dry afford advantages to decay-producing agencies instead of having the protection of the saliva as is normally the case.

We find the trouble greater with the anterior teeth, because the posterior teeth are more strongly supported than the former. We find malocclusion in the posterior teeth as a certainty, and though we have to change the occlusion many times in order to get them into their proper positions, and they are harder to move, it is certain to meet with success and the outcome in such cases is satisfactory. The posterior teeth, however, are generally nearer to position than the anterior teeth, for in classes two and three, as well as class one, the front teeth are forced out of position by the forward movement of the molars and bicuspids, and so our greatest trouble under the conditions named is with the anterior teeth. We find them in many irregular positions, twisted, turned and overlapped, caused by their being forced out of correct position by the stronger teeth posterior to them.

These are the conditions we find starting or already existing in the youth in this class of cases, conditions that should not be allowed to exist and which are sure to seriously handicap the individual; but they are often overlooked or are considered of minor importance, instead of being corrected at the outset and thus preventing the abnormal conditions and disease. If taken care of early this class of cases with the conditions of the gums can be corrected and will be found to return to a normal or nearly

normal condition by the correction of malocclusion. Much depends upon the length of time the case has been allowed to remain uncorrected. It should be corrected as soon after the beginning of eruption of the permanent teeth as possible. This has more than one advantage. The case is not in its exaggerated form, the state of the gums is much better and in a growing condition, the process is not as solid and the teeth movement is much easier; the face takes on its normal type, both as regards shape and expression, and derives a degree of perfection, through early treatment, which would be impossible if the case were delayed and corrected later when the tissues should have obtained their growth.

Not only that, but to delay makes the case much harder to correct, much more irritating to the patient and exceedingly exhausting to the nervous system. The patient has been all this time growing into a more or less nervous condition. I do not wish to infer by this that a patient with malocclusion is always in a very nervous condition or that it is impossible to find a patient with malocclusion with fairly good nervous control, but I do make the statement that the physical condition would be much better if there was no malocclusion and will show improvement after the case has been corrected, one great cause of nervousness having been eliminated.

When the patient is a mouth breather, the lips being held apart by the position of the teeth, the patient will breathe through the mouth from force of habit, even though there is no obstruction to nose breathing. Besides, in breathing through the mouth, the fine particles of dust in the air are also very irritating. This condition is overcome with the correction of malocclusion and the mucous membrane will then return to its normal condition.

During the month of June, while writing this paper, I examined nearly one hundred school children in order to substantiate my statements, if it were possible. In age they were from five years to seventeen, and grades from first to ninth.

There is some contention as to whether we find much malocclusion among the first or deciduous teeth. I am not prepared for that question, for the children examined were, without exception, too old. The youngest one was five years, and this child had already cut its first permanent molars, and at that age the

permanent teeth are exerting an influence in the matter of occlusion. But if there is malocclusion of the deciduous teeth the above conditions will be found to be present in accordance with the degree of malocclusion.

It seems to me we could readily answer the question if enough children at the proper age (from three to five years old) were examined to give us an average. This is difficult, for at that early age they seldom enter our offices for treatment.

In my examinations I found the youngest children with the mouth in fairly good condition. There were a few exceptions. One little girl could only touch her first permanent molars in closing the mouth. Another, a mouth breather, only her first permanent molars and centrals. In still another case the lower right cuspid tooth was entirely exposed on the labial surface, the gums and process having receded until the end of the root was exposed, but the tooth had abscessed for a long time, which must have had a great deal to do with its condition. In quite a number of cases I found abscesses, showing that not enough attention is paid to filling and treating the deciduous teeth. Think of allowing those teeth to become badly decayed and nerves exposed, thus subjecting the child to toothache and afterward an abscess, these conditions being allowed in many cases to remain until the teeth are lost and the permanent ones erupt, at which time the condition generally is overcome, but, can we say without injury to the second teeth and tissues?

In the cases examined at five and six years, I found about one-third of them with very good articulation. From seven to nine there was not as good occlusion present, but I did not find as bad conditions present as regards decay, for the requisite number of permanent teeth were generally erupted, and there had been some attempt at filling, while in the younger children there was no sign of filling or treatment, and of course the teeth were not as good in quality to start with. The conditions of the gums I found growing worse as malocclusion advanced, and more cases where the gums and process were receding. From nine to twelve the malocclusion in the cases present was worse and the gums correspondingly worse, especially in those patients whose teeth were not kept clean. At this age the detrimental results of early extractions were apparent. The anterior teeth on the side where

extracting had been done were not forced as far forward as they should be, and the space left by extraction was closing up. In two cases the occlusion was shown to have been good, but where the teeth had been extracted the space was slowly closing up, resulting in malocclusion of a pernicious kind.

Promiscuous extraction cannot be too greatly condemned, although there are conditions where it is necessary. I believe patients would not demand extraction if the trouble arising from it was fully explained to them. But if it is found necessary to extract, on account of the extent of decay, there is no excuse for not retaining the space and allowing the child to grow normally, getting the best results from development of the jaw, and after a time the space can be bridged over, when we may expect good results.

From the ages of twelve to seventeen, and beyond, I find the malocclusion in a more advanced stage, and of necessity advancing the troubles. Also with malocclusion the habits are formed, which have a tendency to help on the existing condition.

At these periods we find the adenoid conditions generally gone, but catarrhal conditions taking their place, if not also existing before, which help to maintain the breathing habits formed. Also with malocclusion at these stages, we have deposits on the teeth which we have not had to contend with before, and these give cause for our worse troubles, abscesses, pyorrhea, loss of tissue, loss of teeth.

The conclusion seems to indicate that these conditions and their relations are not receiving a proper amount of attention from the general practitioner. They are conditions which are the precursors of a great deal of trouble which we are at times sorely tried in explaining to our patients, and for which, if patients understood correctly, they would demand treatment at a time when success could be assured. It is our duty, as practitioners, to diagnose and overcome these inimical tendencies before they produce results that are difficult, if not impossible, to cure.

Discussion.—*Dr. O. W. White:* I only wish to draw the attention of those who had the privilege of looking at the patient which Dr. Rogers had in her clinic yesterday morning.

There was a case which illustrates this subject to perfection.

It was a bad case of malocclusion and was a severe case of pyorrhea and caries. The posterior teeth were all destroyed by decay, and I think there are very few who would realize the condition of the mouth when Dr. Rogers first assumed charge. It must have been in a frightful condition. We find this in all cases where we have malocclusion to any great extent, because I think in all the pyorrhea cases without a doubt malocclusion is a primary cause. The teeth are not true to their function. They are just the same as any other organ of the body when it is thrown out of position. Its normal circulation is destroyed, and this stops any nutriment going to it, as also the waste products from getting away. In such cases we have congested conditions, causing decay and inflammation, and we are bound to have an unhealthy organ. The largest per cent of the mouths that are presented at our offices have malformation in a greater or less degree and they have diseased gums to a corresponding degree.

I am of the opinion that our only salvation is prevention of these diseases by removing the conditions which act as causes.

Gold Filling with Cement Protection.—My present method is to take the ordinary cement—colored to match the tooth by using various colors—in a very small quantity on the point of a small probe, working it all over the cavity. Take porous gold, of the crystal or fibre varieties, and press it into the cement, covering the entire cavity, and with small hot burnishers in each hand hold the gold from rocking or getting soiled with the cement on the outer surface. We pack with smooth, large neck burnishers the greater part of the filling, burnishing the gold each time with hot instruments, when the next piece will adhere readily. Instruments must be heated about as hot as can be, without drawing the temper—using them while hot. The wet cement under the gold will prevent thermal changes. When the filling is two-thirds made, take a paring chisel and bevel the enamel edge, then place the next piece of gold at the center of the filling and burnish back onto the enamel until the filling is complete.

Having practiced these methods with some advanced improvements each year for about ten years, and watched with great care the comparison with other and older methods, many have come to fully appreciate the advantage in preserving tooth structure, and believe it is soon to be the popular and most practical method of filling teeth. We believe gold and amalgam are unfit materials to use in contact with the teeth, but should be used as secondary materials to protect the cement from the fluids of the mouth, while the cement is the real and only practical preserver of teeth from the ravages of decay.—Dr. L. C. Taylor, *Brief.*

Digests.

THE BEGINNING, PROGRESS AND TREATMENT OF DENTAL CARIES. By Arthur D. Black, B.S., M.D., D.D.S., Chicago. It is the purpose of this paper to consider dental caries principally from the mechanical standpoint, to study the physical injuries of the teeth; where they begin, how they progress and how they may be best treated mechanically. We will not go into the bacteriology of dental caries further than to note certain things which have a direct relation to that which we wish to present. We know that caries is caused by the waste products of certain microorganisms which are practically always present in the mouth. In order that these microorganisms may produce caries, it seems to be necessary that they be practically shut in to themselves away from the saliva, and this condition is brought about in two ways. There may be a collection of microorganisms and food debris in a defect in a tooth, so that the saliva is practically excluded from the deeper part of the mass, and the acid formed by the organisms produces decay. On smooth and perfectly formed surfaces the organisms construct a protecting plaque of gelatinoid which retains the acid in contact with the tooth and prevents the saliva from mixing with it. We know that the organisms are practically always present and that they sometimes form plaques and sometimes do not, and whether they do or do not constitutes the condition of susceptibility or immunity of the person at the particular time. Dr. Michaels of Paris, and more recently several investigators in this country, have shown that certain chemical substances are present in the saliva of individuals who are susceptible to caries, and that these same substances are absent from the saliva of persons who are immune. It is thought that there is an effect upon the life processes of the microorganisms which allows them to form the gelatinoid plaques in the one case and not in the other.

In passing, I might say that the man who will discover the proper means of controlling or counteracting the presence of these chemical substances in the saliva will confer on mankind one of the greatest blessings ever known, for it will mean the absolute control of dental caries.

If these things are true, then we may have the following condi-

tions of susceptibility and immunity: First, the person who is absolutely immune, whose teeth do not decay, even in the defective places in the enamel; second, the person who is relatively immune, in whose teeth decay will occur in the defective pits and fissures, but will not occur in smooth, perfectly formed enamel, because the condition of the saliva is such that the microorganisms are not able to form plaques with which to glue themselves to the teeth; third, the person who is susceptible, in whose teeth decay occurs in both the defects and the smooth surfaces. In considering the beginnings of caries from the mechanical standpoint, we must keep these gelatinoid plaques in mind and remember that they can remain attached to the surfaces of the teeth only in locations that are not kept clean by the movements of the lips, tongue and cheeks and the scouring process of the foods being masticated. We, therefore, have certain areas of the surfaces of the teeth that are rendered immune by use, even though the person be very susceptible.

In the study of caries enough stress has been placed on the importance of the study of this disease as it affects the enamel. The progress of caries in the dentin is simple and entirely secondary. If we understand well the beginnings and progress of caries of the enamel so that we can treat it properly and generally prevent a recurrence, there is little need for study of the dentin in this connection.

THE BEGINNING OF DENTAL CARIES.

As there are two conditions under which dental caries may begin, we must at once divide the beginnings of decay into two classes: First, those which occur in the defects in the enamel—pit and fissure cavities; second, those which occur as a result of the attachment of the gelatinoid plaques to perfectly formed enamel—smooth surface cavities. *Pit and fissure cavities* begin at the lines or points where the lobes of enamel meet in tooth development, in the weak or defective places in the enamel, and decay begins because these defects offer places for lodgment of food. These cavities are found in the occlusal surfaces of the bicuspids and molars, in the buccal and lingual grooves and pits of the molars, and in the lingual pits of the upper incisors. It will be observed that none of these cavities are in the gingival portion of the crowns of the teeth, but they all occur in the

occlusal surfaces or the occlusal two-thirds of the axial surfaces.

Smooth surface cavities begin at those locations on smooth surfaces where a gelatinoid plaque may become attached to the surface and not be disturbed by the natural scouring and cleaning processes of mastication, viz., in those locations where conditions are such that food debris is apt to remain in contact with the surface of the tooth. Examinations of many teeth with small cavities (beginning decays) have shown these locations to be on the proximal surfaces, just to the gingival of the contact point, in the gingival third of buccal and labial surfaces, near the center of this third mesio-distally, and rarely in the same position on the lingual surfaces. If the contact has been lost and the gum has receded, the beginning on the proximal surface will be in a position similar to that on the buccal. I call your particular attention to the fact that these beginnings of decay in smooth surface cavities are always within a narrow band of the tooth surface, corresponding to not more than one-third of the length of the crown, just occlusally to the free margin of the gum.

THE PROGRESS OF DENTAL CARIES.

In the pit and fissure cavity there is no spreading on the surface of the enamel, because that surface is kept constantly scoured. This decay progresses directly toward the dentin and at the same time slightly laterally in all directions in the enamel. In other words, the area of decay in enamel may be represented by a cone with a comparatively small base, which rests on the dentin. When the dentin is reached, caries progresses directly toward the pulp and also in all directions laterally, along the junction of the dentin and enamel. We thus have formed in the dentin an area in the shape of a cone, the base of which is toward the enamel and the apex toward the pulp. The area of the base of this cone will vary in accordance with the perfectness of the structure of the dentin; if the dentin is well formed the base of the cone will be small, if the dentin is poorly formed, if there are many interglobular spaces in the dentin just beneath the enamel, then the acid will penetrate this area rapidly and the base of the cone will be large. In these cavities the decay will generally spread more rapidly laterally in the dentin than in the enamel, along the dento-enamel junction; the base of the cone of decay in the dentin will be larger than the base of the cone of decay in the

enamel, and we may then have backward decay of the enamel, starting at the dentinal ends of the rods and progressing toward the surface. This is the process by which pit and fissure cavities become larger on the surface than the original defect in the enamel, by the undermining of the enamel by the decay in the dentin, followed by backward decay of enamel, with the result that the unsupported rods break away.

In smooth surface cavities the progress of caries is entirely different. It begins in smooth perfect enamel in an area that is not kept clean by the forces of mastication, and under the protection of a gelatinoid plaque which holds the acid in contact with the tooth. Naturally the entire area of enamel underneath the plaque is affected, and as the plaque gradually enlarges more enamel is involved. The central part of the area is attacked first and the penetration of the enamel by the acid there is deepest and gradually more shallow as we approach the margin of the plaque. The area of enamel involved is in the form of a cone, but the cone has its base at the surface and its apex toward the dentin—just the reverse of the pit and fissure cavity. When the decay reaches the dentin its progress is just the same as in the pit and fissure cavity—a cone with its base toward the enamel. As the cone in the enamel has a very broad base in the smooth surface cavity, there is less liability of the lateral decay in the dentin progressing rapidly enough to undermine enamel that has not been already involved on the surface. This happens more frequently in proximal than in gingival third cavities. In the bicuspids and molars the decay in the dentin frequently undermines enamel to the buccal and lingual before it has been injured on its outer surface, and in proximal cavities in the incisors a similar undermining of the enamel to the incisal is observed.

The most important question we have to consider is the extent to which these smooth surface cavities may involve the surface of the enamel. Can the plaque continue to enlarge until the entire surface is involved, or has it definite limitations? We have said that there are certain areas of the tooth on which these plaques may not be attached, even in the mouths of very susceptible persons, on account of the action of the forces of mastication, and these areas therefore mark the limit to which the plaques may extend. We find that this limit is entirely within the

band about the tooth not more than one-third of the length of the crown in width, just occlusally to the free margin of the gum, and even in this narrow band there are several areas where the plaque may not extend; these are the four axial angles of the crown and generally the entire lingual surface. This leaves three sections of the band, one on the mesial, one on the distal and one on the buccal or labial, in which the plaque may be attached. The area on the buccal always occupies the gingival third of that surface in teeth that are fully erupted. The area on the mesial and distal is of corresponding width, but its position depends on the position of the free margin of the gum. When the gum septum occupies its normal or nearly its normal position the area of liability is convex, corresponding to the curve of the gum septum. If the contact is lost and the gum recedes the area of liability recedes also. As the plaque is less apt to be disturbed in the center of these areas, and is more apt to be removed as we approach the angles of the tooth, we are justified in the statement that the center of the area is most susceptible, and the farther we proceed toward the angles of the tooth the more nearly we approach immunity, the angles being immune.

THE TREATMENT OF DENTAL CARIES.

What shall be the treatment, based on the foregoing observations? In the pit and fissure cavity we have observed that decay does not progress on the surface of the enamel, that an enlargement of the original defect occurs only by lateral decay undermining the surrounding rods. Then the indication for treatment is simple: We must enlarge the cavity enough to remove all enamel that has been undermined, remove all of the carious dentin and place a filling that will seal the cavity. This will absolutely cure this decay. It is generally necessary to extend the cavity further along grooves or fissures in order to get smooth margins, and thus prevent the formation of new pits. If there is recurrence of decay in a cavity so prepared it is on account of faulty manipulation.

In smooth surface cavities we have a very different problem. These cavities begin by a surface destruction of enamel and their progress gradually involves more and more of the surface, up to the limit of the area of liability of that surface. If the case presents, after the entire area of liability has been involved, the indi-

cation for treatment is simple; the margins of the cavity of decay have already reached the border of the immune area, and no better position could possibly be found for our filling margins; hence the removal of the decay and the placing of a proper filling constitutes the best possible treatment. But suppose the case presents while the cavity is yet a small one, shall we in this case simply remove the decay and place a filling, when we know that there will be a recurrence of the same conditions on that surface that existed there previously, or shall we anticipate a continuance of the former condition and extend our cavity margins so that they will be within the immune area? It seems to me that it is clearly our duty to do the latter.

The gelatinoid plaque on any particular area of liability is always a single mass which is at first small, located in the central part of the area of liability, but it gradually enlarges. The individual plaque on any area is probably frequently removed mechanically, but a new one takes its place. When the decay has progressed to the extent that the central mass of enamel falls away, then the plaque has lost its starting place and does not reform. Decay does not from that time progress on the surface of that enamel. What happens if such a cavity, supposing it to be a small one, is filled without extending the margins? We restore the contour of the surface, furnish a proper resting place for the nidus of a new plaque, and it is promptly formed, gradually spreads over the margins of the filling, and the products of the organisms underneath attack the enamel just beyond the fillings margins. Thus an area which has become immune is again rendered susceptible to decay by the placing of what may be a mechanically perfect filling.

Then comes the most difficult question of all: To what extent shall we cut away the sound enamel to reach the immune area? That question must be answered by each man in the individual case. We have defined the person who is relatively immune, on whose teeth the plaques do not form, and the person who is susceptible, on whose teeth the plaques will cover the entire area of liability. We must remember that there is every possible grade of susceptibility between these two, and our judgment must direct us in the individual case. We might say that the older a patient is the less wide we need to cut; we might be guided somewhat by

the number of other cavities in the mouth, by the rapidity with which the decay has progressed, by the color of the decayed mass, by the patient's care of the teeth, and other similar things; but we must remember that a person who is immune to dental caries at one time may be very susceptible a year later. The only safe rule to follow in the majority of cases is to disregard the patient's present condition of susceptibility or immunity and place the cavity margins in an area that is always immune, and we can lay down definite rules which will govern us in doing that.

In the buccal or labial cavity in the gingival third the gingival margin should be under the free margin of the gum; the occlusal or incisal margin should be far enough to the occlusal or incisal that it will be kept clean by the cheek or lip, which is usually from one-fourth to one-third the distance from the gingival to occlusal or incisal; the mesial and distal margins should approach closely the mesial and distal angles of the tooth.

In the proximal cavity the gingival margin should be under the free margin of the gum, and we should remember that the free margin of the interproximal gum tissue reaches very close to the contact point when it is in healthy condition; the lingual and buccal or labial margins should be in such positions that they will be kept constantly clean by the tongue, cheek or lip, and the occlusal or incisal margin should be cut beyond the contact point. It is important that the full mesio-distal breadth of the tooth be restored in order to give proper form to the embrasure between the teeth. The more convex the proximating surfaces of the teeth the less wide is it necessary to cut cavities to the lingual and buccal or labial in order to have the margins self-cleansing, and we may often save considerable cavity extension in these directions, particularly in teeth which have rather broad and flat proximal surfaces, by increasing their mesio-distal breadth over the normal, thus widening the embrasure. We are not to discuss in this paper the reasons for cutting occlusal steps in the preparation of all cavities in the bicuspids and molars, as that procedure is for the purposes of retention, resistance to the stress of mastication and the securing of a proper enamel wall, rather than for the treatment of caries itself.

In considering the treatment of caries from the mechanical standpoint, I must mention one other thing—the value of mechan-

ical cleansing of these areas of liability. We have noticed that certain areas of the teeth of the most susceptible persons are rendered immune by the constant scouring that they get by the forces of mastication. Then why cannot these other areas of liability be rendered immune by mechanical cleansing? I believe it is only a question of proper and sufficiently frequent treatment, but I do not see how this can be done by a dentist alone. Most of it must be done by the patient. A patient should be able under proper instruction to keep the areas of liability on the buccal and labial surfaces sufficiently clean to prevent the attachment of plaques, by the use of the tooth brush. The proximal areas cannot be properly cleaned with a brush, and there are few patients who have the ability, energy and determination to properly cleanse these surfaces with floss and tape as frequently as need be. And I doubt if it is possible to have them come to the dentist often enough to prevent decay in the majority of cases, yet such cleansing should be beneficial in proportion to its frequency.—*Texas Dental Journal.*

SOME EVIDENCES OF ORGANIC EVOLUTION. By Mr. J. A. Rose, L.D.S., London, Eng. My reason for choosing Evolution as the subject of my paper is because it is to me a most fascinating study and because I believe it to be of universal interest, and more especially so to the members of a scientific society such as this.

The subject is so vast and all-embracing that it is difficult to know where to begin, what to leave out, and when to stop. But I have decided to limit myself to Evolution in the organic world because I think that it is that phase of the question which bears the most close relation to our own particular studies.

I cannot, of course, claim to put before you anything new, and in a brief paper of this description I can only touch the subject very superficially; but to those of you who have studied this matter for yourselves I can only say that I hope you will not be bored, and to those of you who have not I say that I hope that this meeting may be the starting point of such a course of study.

In the first place, I must briefly refer to some of the forces which guide and control organic or biological development. The only ones I think I need mention here are: The Strug-

gle for Existence, Variability, Natural Selection, and Divergence of Character. The first of these, the Struggle for Existence, has a double significance and has been subject to much misrepresentation. It expresses the two great functions of all living organisms, Nutrition and Reproduction. In order that an organism may continue to live it must get food, and in order that its kind may continue to exist it must leave progeny. These two aspects of this principle and their results are so inextricably interwoven that it is impossible to select any one set of phenomena and say "This is the result of the struggle for nutrition," or "This is the result of the reproduction struggle." They are essentially cooperators, and their results, the results of their cooperation.

The use of the term "struggle" is somewhat unfortunate, yet it is difficult to see what other can be employed. It has been interpreted by many people to mean that Nature is essentially cruel; that, in the words of Robert Blatchford, "all life is a perpetual deadly struggle for existence. The law of nature is the law of prey."

In contradiction of this view let me give you another quotation; this time from Mr. A. R. Wallace, whose knowledge of animal life ranks with that of Darwin himself. In his book on "Darwinism," Mr. Wallace says: "There is good reason to believe that all this is greatly exaggerated, that the supposed torments and miseries of animals have little real existence, but are the reflection of the imagined sensations of cultivated men and women in similar circumstances, and that the amount of actual suffering caused by the struggle for existence amongst animals is altogether insignificant; on the whole we may conclude that the popular idea of the struggle for existence entailing misery and pain on the animal world, is the very reverse of the truth. What it really brings about is the maximum of life and of the enjoyment of life, with the minimum of suffering and pain. Given the necessity of death and reproduction—and without these there could have been no progressive development of the organic world—and it is difficult to imagine a system by which a greater balance of happiness could have been secured. And this view was evidently that of Darwin himself, who thus concludes his chapter on the struggle for existence: 'When we reflect upon this struggle, we may console ourselves with the full belief that the war of nature is not incessant, that no fear is felt, that death is

generally prompt, and that the vigorous, the healthy, and the happy, survive and multiply.' "

The second principle I touch on is "Variability." This law is an undeniable fact, but at the same time an inexplicable mystery. So far as I am aware no one has yet been able to explain why offspring of the same parents should differ, but they do. Is there anyone of us who, looking at a litter of puppies, for instance, has not been struck by their different color, shape or build? In how few families, too, do we find brothers or sisters so alike as not to be recognized apart. And the difference lies not only in appearance, but in temperament and character also. Why is it? The reason is unknown, but the fact is obvious, and it forms a very important factor in the theory of Evolution.

There are many more animals born every year than the world can possibly provide for. The obvious consequence is that only the minority can survive. This is where Natural Selection steps in. Where there are several progeny, each differing in some respect from all the others, there must be some more fitted by their variations to carry on the struggle for existence than others, and by Natural Selection those with the more profitable variations are preserved, whilst the others perish. This method of retaining the most useful variations while the others are obliterated, naturally assists in the progressive development of living organisms. The principle applies not only to individual families, but to species also. For instance, two closely allied species were brought together into a restricted area and in the course of a few generations it was found that one of the two had completely disappeared, leaving the other in possession of the field. There was here no question of conflict. The two species settled down together quite amicably, and freely interbred, with the result already stated. So that without any thought of pain or conflict Natural Selection acted and the survival of the fittest was secured.

Briefly, then, what Natural Selection ensures is the development of the organic world by the preservation of the individuals, species, and genera more fitted for the struggle for existence and the extinction of the less fit.

The fourth principle I mentioned was "Divergence of Character." What it means is this. If, say, there are two varieties of a species of one generation differing slightly from one another, the suc-

ceeding generations will not maintain just that difference, but will gradually get more and more unlike, the members of each generation differing from one another to a greater degree than those of the preceding one; each variety, as it were, descending along diverging lines, eventually becoming sufficiently distinct to be accounted separate species.

These then are four of the great principles which have assisted in the Evolution of the organic world up to that point where it exists to-day; not by acting separately but collectively, and in very close relation one to another. Indeed, from what I have said I think you must see that they are all interdependent. The changes they have brought about have been very gradual, for Evolution is essentially a slow process; so slow, indeed, as only to be recognized as a process when looked at in the light of history. We might even doubt whether there has been time enough for all the development which must have taken place, were it not for the facts of geology, which prove to us that the earth has been in existence for countless ages, running into hundreds of millions of years.

If the Evolution theory be correct, then we should expect to find evidences of it still existing, and so we do. There are many clear and convincing proofs of its truth to be brought forward; more indeed than I can use now. So I intend to confine myself to three. These three are to be found in the sciences of Palæontology, Comparative Anatomy and Embryology.

In considering the evidence which the first of these has to offer we must bear in mind two important facts. One is that the geological record is very imperfect. That this is a fact and not merely a way of wriggling out of a difficulty, let me demonstrate by quoting two striking circumstances.

In the sandstone formation of the Connecticut Valley there have been discovered some remarkable impressions. They are evidently the footprints of an animal of gigantic size; and yet although these impressions are very numerous and extend over large areas, not a sign of the skeletons has anywhere been found. The other instance is this: Palæontologists have had occasion to work out the nature of fossil remains of which there has been nothing left but casts of the bones, the solid matter of the skeleton having been completely dissolved away. Had the deposit been of slightly different nature it would probably have fallen together into one mass and

thus no record have been left; which I expect was what happened in the previous instance. The other fact I wish you to remember is that when the skeleton is discovered which connects two apparently irreconcilable existing species or genera it does not always represent the actual passage from one form to the other. The facts of Palæontology are striking, however regarded, but when viewed in the light of these qualifying conditions they become very impressive and arresting.

To go into a detailed description of the many connecting links which are found in our geological formations would be to take you into a sphere of wearisome technicalities, so I must be content with giving you a few illustrations of the wonderful results which have been obtained. Although to the zoologist they are only different genera of the same sub-order, to the lay mind there is perhaps absolutely no likeness or connection between the pig and the camel. Yet one of the achievements of Palæontology has been to establish an almost unbroken chain of links between these two. Other discoveries have resulted in the linking of animals differing as much as to all appearances do the horse, the rhinoceros and the tapir. I shall have occasion to speak of these three again later on, but in passing I would like to point out that the horse is one of the jewels in the crown of the palæontologist. His ancestry is as well established and attested as that of the most blue-blooded family in our peerage, whose ancestors came over with William the Conqueror. To quote Charles Tomes: "The extinct ancestors of the horse are now, however, pretty well known, thanks particularly to the researches of Professor Marsh; starting with the Eohippus, no larger than a fox, with four well-developed toes and a rudiment of a fifth, through the Eocene Orohippus (four-toed), the Miocene Mesohippus as large as a sheep (three-toed with rudimentary splint), the Upper Niocene Miohippus (three-toed), the Lower Pliocene Protohippus, as large as an ass (three-toed, but only the middle one reaching the ground), which was like the European Hipparion or Protohippus; then the Pliocene Pliohippus, which has lost the small hooflets, whilst in the Upper Pliocene, the true Equus first appears."

But wonderful as these results are, there is something yet more wonderful to be told. For these animals, which I have named, however different they may be, are members of the same class, Mam-

malia. But skeletons have been found which connect two of the great classes of the sub-kingdom of vertebrates, viz., birds and reptiles. Several distinct links of this description have been laid bare, one, indeed, the archæopteryx, so intermediate that it is hard to know whether to call it a reptilian bird or an avian reptile. These remarks, I think, will serve to indicate what powerful and weighty evidence in support of the theory of Evolution is provided by the fossil remains which are stored up in the strata of the earth's crust.

Leaving the marvels of Palæontology, let us turn to the sphere of Comparative Anatomy; and first I will speak of Comparative Dental Anatomy. Here I feel I am treading on dangerous ground. The subject itself is to my mind far from easy, and it is rendered all the more difficult by the fact that I am speaking to an audience of experts. Under these circumstances may I ask you to give me your utmost indulgence.

Among the theories which attempt to explain the development of modern teeth, that of Cope and Osborn, known as the tritubercular theory, is perhaps the most widely accepted.

Broadly speaking, this theory claims that modern mammalian teeth have descended from one parent form called tritubercular; this is a tooth with two roots, the crown having three cusps arranged in the form of a triangle. In the early Mesozoic period simpler forms than this are found, although the tritubercular type predominates, but in Triassic, Jurassic, Cretaceous, and early Eocene times every known mammal is in some form of trituberculism or multituberculism; the suggestion being, of course, that the multitubercular tooth is but a further development of the tritubercular; for we find Charles Tomes writing:—"From these trituberculate types of tooth are probably derived from the more complex patterns of the teeth of later mammals."

The development of these more complex forms is brought about in various ways, amongst which may be mentioned, addition of cusps, addition of some cusps with suppression of others, addition or suppression of tissues, etc.

From the point of view of evidence of organic evolution, I think, perhaps, the teeth of perissodactyle Ungulates are the most interesting. In this order the molar teeth are kept in an efficient state of roughness by the enamel dipping deeply into the crowns; by the

cusps, in short, being of very great depth, and in the more complex forms by the crown being entirely covered by cement. It consequently happens that after the immediate apices are worn away the flattened grinding surfaces of the teeth are mapped out into definite patterns; on account of the light thus thrown upon fossil remains, which often consist of little else than the teeth, these patterns have been studied with great care. The result has been to establish a general community of type, so that, dissimilar as they at first appear, it is possible to derive all, or nearly all, the configurations of their crowns from one or two comparatively simple patterns.

Now turning to a more general review of Comparative Anatomy, let us take the highest living organism, Man, and compare him with other organisms more or less closely related to him. We cannot fail to be struck at once, not with the differences, but with the marvelous similarities in form and structure. To take only one point, the limbs of all classes of vertebrates, including the fin of the fish, the wing of the bird, the leg of the quadruped, the arm and leg of the ape and of man, all show but one method of formation, differently developed 'tis true, but retaining their similarity of structure even in the most diverse stages of development.

It is a matter of common knowledge that fishes breathe with their mouths, the air passing into their lungs and the water out through the gills at the side of the head. It may not be so commonly known, however, that it is no infrequent occurrence for human children to be born with gill-slits in their necks. The slits close, of course, in time, although sometimes leaving their marks throughout life.

Again, the ear itself, with all its marvelous mechanism, is but an adaptation of the gill of the fish; and occasionally it is found that the gill slit in the neck is developed too and the child born with neck ears in addition to normal ones. While on the subject of ears, may I remind you of the presence in the human body, in a rudimentary condition, of the muscles which in lower animals serve to move and erect the pinna of the ear. Indeed, people are frequently met with who have the power of moving their ears.

Another interesting relic of prehistoric days we have, although we may perhaps not consider it a flattering one. I refer to the remnant of a tail and the muscles for wagging it which we all

possess. I confess, however, that I have never met the man who could wag his tail as well as move his ears.

These things I have mentioned are but a few of many such useless structures to be found in the human body. Others no doubt will readily spring to your memory. The point to be emphasized in connection with these rudimentary organs is their obvious uselessness. It is difficult to see how their presence is to be explained save on the theory that man's body is but a devolpment of some other organisms which possessed them and to whom they were of use. Another striking feature is to be found in cases of malformation. Modern pathology, working on the Evolution hypothesis, has come to the conclusion that such cases are nothing more or less than an arrest in the development of the embryo at some early stage, that is that the misformed part has stopped at a stage which was normal to some lower organism instead of fully developing into the human form. So strong, indeed, is the evidence which a close study of anatomy lays bare, that some evolutionists have gone so far as to state that they are willing to stake their whole case on this alone.

I can well imagine that such facts as these would cause considerable logical difficulty to an audience unversed in the science of life. I can imagine them advancing the objection that if each body bear the marks of progress, each body must have made the actual progression. The answer of course is, that what they raise as an objection is simply a statement of truth as proven by the science of Embryology.

In considering this we enter on a subject of such interest and importance as, in my opinion at least, to outdistance and belittle the other sciences which bear upon this question of Biological Evolution.

Under these circumstances you will, I hope, pardon me if I shrink from giving it original treatment, and read instead a somewhat long passage from Henry Drummond's "Ascent of Man:"—

"Between the early cell and the infant's formed body, the ordinary observer sees the uneventful passage of a few brief months. But the evolutionist sees concentrated into these few months the labor and the progress of incalculable ages. Here before him is the whole stretch of time since life first dawned upon the earth; and as he watches the nascent organism climbing to its maturity he

witnesses a spectacle which for strangeness and majesty stands alone in the field of biological research. What he sees is not the mere shaping or sculpturing of a Man. The human form does not begin as a human form. It begins as an animal; and at first and for a long time to come there is nothing wearing the remotest semblance of humanity. What meets the eye is a vast procession of lower forms of life, a succession of strange inhuman creatures emerging from a crowd of still stranger and still more inhuman creatures; and it is only after a prolonged and unrecognizable series of metamorphoses that they culminate in some faint likeness to the image of him who is one of the newest yet the oldest of created things.

"Hitherto we have been taught to look among the four fossiliferous formations of geology for the buried lives of the earth's past. But Embryology has startled the world by declaring that the ancient life of the earth is not dead. It is risen. It exists to-day in the embryos of still-living things and some of the most archaic types find again a resurrection and a life in the frame of Man himself. It is an amazing and almost incredible story. The proposition is not only that Man begins his earthly existence in the guise of a lower animal-embryo, but that in the successive transformations of the human embryo there is reproduced before our eyes a visible, actual, physical representation of part of the life history of the world.

"Human Embryology is a condensed account, a recapitulation, or epitome of some of the main chapters in the natural history of the world. The same processes of development which once took thousands of years for their consummation, are here condensed, foreshortened, concentrated into the space of weeks.

"Each platform reached by the human embryo in its upward course represents the embryo of some lower animal which in some mysterious way has played a part in the pedigree of the human race, which may itself have disappeared long since from the earth, but is no wand forever built into the inmost being of Man.

"These lower animals, each at its successive stage, have stopped short in their development; Man has gone on. At each fresh advance his embryo is found again abreast of some other animal embryo a little higher in organization than that just passed. Continuing his ascent, that also is overtaken, the now very complex

embryo making up to one animal-embryo after another until it has distanced all in its series and stands alone.

"As the modern stem-winding watch contains the old clepsydra and all the most useful features in all the time-keepers that were ever made; as the Walter printing press contains the rude hand machine of Gutenberg and all the best in the machines that followed it; as the locomotive of to-day contains the engine of Watt, the locomotive of Hedley and most of the improvements of succeeding years, so Man contains the embryonic bodies of earlier and humbler and clumsier forms of life."

"Yet in making the Walter press in a modern workshop the artificer does not begin by building again the press of Gutenberg, nor in constructing the locomotive does the engineer first make a Watt's machine and then incorporate the Hedley and then the Stephenson, and so on through all the improving types of engines that have led up to this. But the astonishing thing is that in making a Man, Nature does introduce the framework of these earlier types, displaying each crude pattern by itself before incorporating it in the finished work.

"The human embryo, to change the figure, is a subtle phantasmagoria, a living theater in which a weird transformation scene is being enacted, and in which countless strange and uncouth characters take part. Some of these characters are well known to science, some are strangers. As the embryo unfolds, one by one these animal actors come upon the stage, file past in phantom-like procession, throw off their drapery and dissolve away into something else. Yet, as they vanish, each leaves behind a vital portion of itself, some original and characteristic memorial, something itself has made or won, that perhaps it alone could make or win—a bone, a muscle, a ganglion, or a tooth—to be the inheritance of the race. And it is only after nearly all have played their part and dedicated their gift, that a human form, mysteriously compounded of all that has gone before, begins to be discerned in their midst.

"Through all what zoological regions the embryo passes in its great ascent from the one-celled forms, one can never completely tell. The changes succeed one another with such rapidity that it is impossible at each separate stage to catch the actual likeness to other embryos. Sometimes a familiar feature suddenly recalls a form well-known to science, but the likeness fades and the

developing embryo seems to wander among the ghosts of departed types. Long ago these crude ancestral forms were again the highest animals upon the earth. For a few thousand years they reigned supreme, furthered the universal Evolution by a hair-breadth and passed away. The material dust of their bodies is laid long since in the palæzoic rocks, but their life and labor are not forgotten. For their gains were handed on to a succeeding race. Transmitted thence through an endless series of descendants, sifted, enriched, accentuated, still dimly recognizable they reappeared at last in the physical frame of Man. After the early stages of human development are passed, the transformation becomes so definite that the features of the contributory animals are almost recognizable. Here, for example, is a stage at which the embryo in its anatomical characteristics resembles that of the vermes or worms. As yet there is no head, nor neck, nor backbone, nor waist nor limbs. A rough cylindrical headless trunk—that is all that stands for the future man. One by one the higher invertebrates are left behind, and then occurs the most remarkable change in the whole life-history. This is the laying down of the line to be occupied by the spinal cord, the presence of which henceforth will determine the place of Man in the Vertebrate sub-kingdom. At this crisis, the eye which sweeps the field of lower Nature for an analogue will readily find it. It is a circumstance of extraordinary interest that there should be living upon the globe at the present moment an animal representing the actual transition from Invertebrate to Vertebrate life. The acquisition of a vertebral column is one of the great marks of height which Nature has bestowed upon her creatures; and in the shallow waters of the Mediterranean she has preserved for us a creature which, whether degenerate or not, can only be likened to one of her first rude experiments in this direction. The animal is Lancelet or Amphioxus, and so rudimentary is the backbone that it does not contain any bone at all, but only a shadow, or prophecy of it in cartilage. The cartilaginous notochord of the Amphioxus nevertheless is the progenitor of all vertebral columns, and in the first instance this structure appears in the human embryo exactly as it now exists in the Lancelet. But this is only a single example. In living Nature there are a hundred other animal characteristics which at one stage or another the biologist may discern in the ever-changing kaleidoscope of the human embryo.

"Even with this addition, nevertheless, the human infant is but a first rough draft, an almost formless lump of clay. As yet there is no distinct head, no brains, no jaws, no limbs; the heart is imperfect, the higher visceral organs are feebly developed, everything is elementary. But gradually new organs loom in sight, old ones increase in complexity. By a magic which has never yet been fathomed, the hidden Potter shapes and reshapes the clay. The whole grows in size and symmetry. Resemblances, this time to the embryos of the lower vertebrate series, flash out as each new step is attained—first the semblance of the Fish, then of Amphibian, then of the Reptile, last of the Mammal. Of these great groups the leading embryonic characters appear as in a moving panorama, some of them pronounced and unmistakable, others mere sketches, suggestions, likenesses of infinite subtlety. At last the true Mammalian form emerges from the crowd. Far ahead of all at this stage stand out three species—the Tailed Catarrhine Ape, the Tailless Catarrhine, and last, and differing physically from these mainly by an enlargement of the brain and a development of the larynx, Man."

Mr. President and Gentlemen, having thus briefly indicated some of the evidence on which the Evolution hypothesis rests, I leave the subject with you. I should like to impress upon you that I am by no means an authority on this matter; so that it is quite probable that you will be led to ask me questions which I shall be quite unable to answer; in which case I ask you not to judge me harshly. —*British Journal of Dental Science.*

CRITICAL ESSAY—THREE INTERESTING ARTICLES CONCERNING THE DENTIST AND PHYSICIAN OF THE FUTURE. By the editor of *Uric Acid Monthly.* A question of considerable interest at the present time, and one that is agitating some of the best minds in both professions, is how best to establish on a firm basis the close relationship which naturally exists between the work of the dentist and that of the physician. Shall dentistry become a specialty of medicine and surgery, or would it be better to incorporate the principles of the latter in an expanded course of dentistry? In short, shall dentistry in the future include the *art* of dentistry and the science of medicine?

Or shall medicine in the future include dentistry as one of its specialties?

That the present divorced condition of affairs has led to weakness and ignorance on both sides may be seen in the fact the physician is unable to appreciate the importance of recognizing certain oral conditions in the diagnosis and treatment of many systemic disturbances; while, on the other hand, the dentist fails to understand that some underlying constitutional dyscrasia is often responsible for the oral manifestations he meets with, and ought to be considered in any rational treatment of the case.

Some interesting observations, in the nature of a prophecy, concerning the dentists and physicians of the future, have appeared recently in papers published in the current medical journals, to the following three of which we direct attention here as being apropos, to-wit:

1. *The Boston Medical and Surgical Journal,* June 8, 1905, contains an editorial on "The Physician of the Future," based on an address delivered to the graduating class of the Medical and Dental Schools of Columbian University, Washington, D. C., by Dr. H. W. Wiley of the United States Department of Agriculture, who presented some suggestions in a way to attract attention.

Dr. Wiley believes that of all the arts near to the welfare of man the two nearest and most necessary are the art of agriculture and the art of healing. "Man must first of all be nourished, and next to this, kept in health. A time might come when lawyers would disappear; we might grow perfect enough to dispense with ministers of the gospel, but Ceres and Hygeia would continue to be indispensable.

"Good food well masticated," continues he, "and good hygiene well applied, mean good health. But good food is not prechewed and predigested food, and the professions of medicine and dentistry must stand together in the future to fight such evils. Those who can furnish the people with good teeth and keep their stomachs in prime condition need not care who makes the laws nor who writes the songs in this country."

Dr. Wiley believes that the specialist and the health officer are the forerunners of the physicians of the future, and, judging from the tenor of his subsequent remarks, he is of the opinion that the dentist is in reality such a specialist and will be found fighting

shoulder to shoulder in the ranks of those whose aim is to preserve the parts of the human organism in such form and repair as to guarantee good health to their possessor.

2. *The Southern Clinic,* May, 1905, has for its leading contribution an article by H. B. Ray, M.D., D.D.S., of Tompkinsville, Ky., on the subject of "Dental Advice to the General Practitioner," the man who is usually the first to see cases requiring dental attention and consequently should know the correct thing to suggest in the more common cases requiring dental advice.

This author is of the opinion that the oral condition most frequently met with by the medical practitioner is an aching tooth, and that it is necessary to understand the cause which produces the toothache in order to be able to intelligently treat the case. Inasmuch as the painful and troublesome condition often leads to alveolar abscess if relief is postponed, it becomes doubly necessary for the physician who first sees the case to know just what advice to give the patient in order that he may be spared the pain and consequences incident to this state of affairs, which oftentimes results in an alveolar sinus, and in extreme instances even necrosis of the jaw.

In those cases in which there is a cavity, but no pulp exposure, he thinks that the treatment is simple enough; that prompt relief usually follows the local application of a sedative and the exclusion of the oral secretions from the cavity, after which temporary procedure the patient should be advised to consult a competent dentist.

The kernel of Dr. Ray's advice is to be found in his recommendations to the physician to so acquaint himself with the rudiments of oral prophylaxis that he may be enabled to intelligently apply "first aid" in a given case, and then refer his patient to the proper authority—the dentist. But at the same time we would suggest that the dentist himself has an equal responsibility; he should be enabled to determine whether the trouble is altogether a local one or not. For example, the disabled tooth and its surroundings may be only one of the manifestations of some systemic disorder (as lithæmia or gout), in which case constitutional treatment is indicated. The dentist should know either what internal remedies to employ in such a case or else (after

applying his local measures for relief) refer the patient back to a competent physician.

Concerning the points above mentioned, we are fully persuaded that the physician of the future will be in a position to carry out the plan suggested by Dr. Ray, and that the dentist of the future will be sufficiently grounded in the principles of medicine to combine both local and general treatment in the manner we have suggested.

3. In a paper read before the Pennsylvania State Dental Society, at Ligonier, Pa., George W. Cupit, D.D.S., considered somewhat at length the subject, "The Making of Dentists," which was subsequently published in the *Medico-Chirurgical Journal,* May, 1905.

This author truthfully says: "As it stands to-day, a graduate of medicine could no more practice dentistry than could a graduate of a purely dental course practice medicine—i. e., speaking from a practical and not a legal viewpoint. Whether this peculiar relation is to continue indefinitely, and the profession of dentistry, like those of law, medicine and theology, is to remain separate and distinct among these her sister professions will be determined probably within the next decade. So wonderful has been the development of dentistry that it has literally outgrown itself, passing from an experiment, with a few mechanical principles in the primitive tooth extraction by the barber and the blacksmith to the condition of to-day, when the intelligent practice of dentistry is the embodiment of the highest degree of art on its practical side, and on its theoretical side a great part of the science of medicine."

Dr. Cupit looks forward to the day when dentistry will include the science of medicine also, which shall enable every graduate of dentistry to first obtain the M. D. degree and then that of Doctor of Dental Surgery. He believes that if we will but look over the field to be covered by the dental graduate and practitioner, we shall find that nothing short of a knowledge of medicine—the anatomy and physiology; the chemistry and materia medica, with its pharmacology; the study of life in biology; of disease in pathology; its causes in bacteriology; and its treatment in therapeutics—will facilitate the intelligent consideration, understanding and treatment of the pathological conditions of

the system resulting from dental lesions and disorders, as well as those of dental disorders resulting from systemic disturbances.

Speaking from the dental standpoint, he says: "How seldom does the physician appreciate the importance of oral conditions in the diagnosis of many systemic disturbances! But," adds he, "these are motes in the eye of our brother; let us look to the beam that is in our own. How many of us are able to recognize catarrh of the stomach or a gastritis when we have symptoms in the mouth indicating such condition; or tonsillitis in its more acute form, or facial neuralgia, and to prescribe intelligently for the relief of them?"

To meet the world's need for a continually growing higher standard, in dentistry as well as in other fields, Dr. Cupit thinks it will not do to continue to admit the same poor material and quality of applicant that mark the average list of matriculants in the dental schools of to-day. As he says, "It might just as well be expected to make a mahogany table out of a pine board, as to make the broad, scientific modern dentist out of many of the applicants seeking admission into our schools to-day."

The standard for admission must be raised. This, he thinks, is the remedy. Many of the present applicants have apparently never passed out of the secondary grades of our public schools, and are unable to write legibly or to spell correctly; they have never been taught to reflect or to reason; many are foreigners and unacquainted with our language, and need the first and often the second year to master English. "These," he thinks, "are some of the adverse conditions with which the colleges have to struggle at present. How can they be expected to turn out in the too short time from such material the scientific dentist that the world is beginning to demand?"

We are in accord with this author's opinion that one important duty of the future dental school and its teachers will be to develop the latent talents of the student for scientific study, and open up a new field of usefulness for him in the science of his profession; and, even then, the allotted time of his earthly life will be none too long to perfect him in the line for which he may be best fitted. Not in all the learned professions is there so great a need for laboratory work as in dentistry. For the proper study of pathology, the pathological laboratory is needed;

for that of bacteriology, the bacteriological laboratory; of chemistry, the chemical laboratory; of materia medica, the pharmaceutical laboratory; of prosthetics, the mechanical laboratory; and we may with advantage add, that for the first year's work at least, a laboratory for operative dentistry is needed.

In conclusion it may be said that, as an example of the immutability of natural law, the fact may be cited that invariably when the natural artisan is found struggling with science, and the born scientist is found struggling with mechanics, it is but a question of a short time when the scientist will cease to operate and the mechanic will cease to "science."

REMINISCENCES OF FORTY ODD YEARS OF PRACTICE. By J. N. Crouse, D.D.S., Chicago, Ill. Through several communications which I have received recently relating to things past and present, the thought has been suggested that it might be interesting to go back forty years and review the way in which dental education was attained and dentistry was practiced.

At that time when a young man conceived the idea that he wanted to become a dentist he made application to some practitioner to become a student in his office. And what the student acquired in the way of an education in six months or a year often constituted all the qualifications he possessed when commencing the practice of dentistry. However, this was not always the case. Frequently a position under a tutor in an office was only the first step preliminary to entering college. This tutorship, by the way, had some advantages that are lacking now, in that when a young man entered an office, if the practitioner had sufficient integrity to be truthful, he would give the young man advice as to whether or not he would make a dentist. The writer can call to mind several instances in which young men after entering offices and remaining a few weeks, or months at most, were advised to abandon the idea of becoming dentists and to take up other occupations which would enable them to make a living more successfully than the practice of dentistry, as they were totally unfit in natural endowments for the duties of dentists. In other cases young men having read text books in an office for a few months then entered one of the colleges, a few of which were in existence at that time, and two courses of four months each were required before graduation, although five

years' practice was equivalent to one course. The equipment and facilities of these schools as compared with the schools of to-day were very meager. In the oldest and best equipped schools there were not operating chairs enough in the clinic for the students to have the use of one more than every other day. The teachers in the capacity of demonstrators in the clinical department were very few also, there being but one demonstrator for the whole class, so that it became necessary for the beginner in the first course to get instruction when he could from the more advanced students. The contrast between the lectures given at that time and now would probably not show so great a difference, but the present equipments and even the corps of teachers are now so much superior to what they were then that the comparison would indicate that a graduate from a dental school to-day, other things being equal, should be far superior in training to enter our profession than in the years to which we refer. The contrast between the equipments and methods of practice of that time and now are very great. It will be remembered that there were no dental engines. Hand drills, hand excavators, chisels; and the separating file especially was an important part of the outfit. Napkins and bibulous paper with tongue holders constituted the method of controlling the saliva while the filling was being inserted. The changes from this condition to more complete equipments were very rapid after the rubber dam was discovered and brought to notice first by Barnum. By a chance the writer was one of the first to receive instructions from Barnum himself in '64 or '65. It occurred in this way: I had been trying to devise some better method of shutting off the saliva and was trying to accomplish this with oiled silk, waterproof cloth, etc., not knowing that there was such a thing as sheet rubber. Barnum, having applied for a patent, came early to see what I had been doing, and thus it was that I received early instructions in its use and value. This made it possible for me to be the first to demonstrate its usefulness to the students in '66 and '67 in their second course in the Pennsylvania College.

In the year '70 the first dental engine was brought into notice. It was constructed with two flywheels propelled by an exhaust bellows, which turned the shank of the handpiece. Barring the defect in the handpiece itself, it constituted a very good dental

engine. This was brought to the dental profession by George F. Green, of Kalamazoo, Mich. Having disposed of this device on unfavorable terms to himself, as he thought, he conceived the idea of bringing out one run by electricity, and the writer is now in possession of the first electric dental engine that was ever offered the profession.

Following close upon this came the different cord engines, mallets, etc. Thus equipped with these useful devices, the greatest of extremes in methods of practice followed. The permanent separating of teeth with V-shaped separations and self-cleansing surfaces, as they were called, could be done so much more rapidly with a corundum disk revolved by an engine than they could with the separating files that the teeth in the mouths of the patients were mutilated and injured to an extreme now scarcely conceivable. Numerous articles were written upon the subject and a book by Arthur on "Prevention of Decay" in '71. Herein was advocated the separating of teeth even before decay had taken place in many instances. The book was written in an interesting fashion, on which account many practitioners were misled into adopting this vicious practice. The separations between molars and bicuspids thus made impossible thorough mastication of food, and destroyed the tissue between the teeth. Having been a victim of this form of operation myself early in life, the separations between my teeth made it almost impossible to get through a meal without removing the impacted food, so that the toothpick became an important factor with me. When I came to practice dentistry this method was not adopted on my part, and early I became a radical opponent of this line of practice and have been a constant student as to the best methods in the care of the interproximal spaces since. I regard it as one of the most difficult things in our profession to know in just what form to leave the fillings in proximal cavities. I frequently leave the final finishing of a filling for some time to see what will be best to do after the teeth have been used a while.

With the rubber dam, engines, more perfect drills and electrical and mechanical mallets, the use of cohesive gold was carried to another great extreme; and especially in the adoption of heavy gold, No. 60, No. 120 and as high as No. 240 being used by many practitioners to the exclusion of all the lighter numbers and to the exclusion of the non-cohesive gold, the filling being started from

retaining pits. The use of cohesive gold brought into prominence a very radical method of practice wherein men often consumed four to six hours in condensing the gold in a large contour or large restoration of lost tooth substance, and yet this kind of practice never required anything like the skill and good judgment that is necessary in the use of gold when combining non-cohesive and cohesive, which, when combined, make the best kind of a filling, and yet men became famous through their persistence and power of endurance in performing these operations. And while beautiful fillings were made by these operators, as a universal practice it was unwise. The men of sense and conservatism gradually abandoned these extremes, and, while sticking to the use of gold, they adopted a conservative course, using the non-cohesive gold for the protection of the walls and edges and cohesive gold to give the strength and bring out the contours. At the same time, another class of men of standing in the profession came out and advocated the abandoning of gold altogether and the using of plastics. This practice was short-lived, but did great harm for a time by misleading the young practitioners.

One of the greatest extremes and one causing greater injury than any yet named was the use of vulcanized rubber for the insertion of artificial teeth. Unscrupulous individuals under the name of dentists removed all the teeth, at all ages, from mouths in which decay was setting in, and inserted plates, and to my certain knowledge practitioners in many instances adopted this line of practice to the exclusion of all others. Let me give a little in detail the evils that followed. First, the extraction of the teeth of young people was carried to the greatest extremes; especially was this true in case of young girls, who, in their desire to improve their looks, would have all of the upper teeth and often the lower ones removed and artificial teeth inserted on vulcanite plates. This led to the result that in the course of a few years, in the case of the young, the entire alveolar process would be absorbed, leaving nothing but gum tissue for a ridge, and it happened to be my lot to treat some of these cases when renewal of these plates was required; and the only way that anything like a natural impression of this could be obtained was with very thinly mixed plaster of paris. This multitude of poor duped individuals went through life in this deformed condition, wearing plates with artificial teeth.

It is to be hoped that many of them never realized their full loss. This imposition on the people was carried on quite extensively by a class of men without other qualifications than being able to extract teeth and insert artificial teeth on vulcanite plates. At that time the fee they received was higher than now and it became quite a profitable business.

About this time the Goodyear Dental Vulcanite Company became a conspicuous factor in the dental profession. The Goodyear patent having expired (which patent was a patent on the vulcanizing of rubber) the company got a renewal of the patent covering the application of the process to dentistry, under the name of the Cummins patent, and, being well organized, they began preying on dental practitioners, compelling them to take out licenses and pay royalty on the use of rubber for plates for artificial teeth. To counteract this, funds were raised in all parts of the country and placed in the hands of a committee to carry on a litigation in the way of testing the validity of this patent. This resulted in our being defeated in the Supreme Court. An investigation of the methods employed in this suit proved collusion; that the rubber company paid the attorney employed by the dentists a much larger fee than he received from the dentists, thus securing his co-operation in winning a favorable decision on the validity of their patent. The Supreme Court, on learning the facts, reversed its decision and remanded the case back to the lower court for a rehearing. The dental profession by this time, however, had become so demoralized that it was impossible to raise funds sufficient to conduct the rehearing of the case, and so the dental profession accepted the decision which resulted in the payment of royalty running up into millions of dollars. This bankrupted half the dental profession, while the patent would have been found not worth the paper it was written upon if it had been thoroughly tested in the courts.

To an observing practitioner of forty years, familiar with the many radical mistakes and changes in practice from one extreme to another, the question arises, are we through with our extremes? Let us see. I think that the history of the future will say that we have been led into quite as great an extreme in the use of porcelain inlays as in any of the extremes that have died out and where conservative methods have been adopted in their stead. I am somewhat timid about making this comment when the great

army of reputable practitioners are advocating the use and superiority of porcelain over all other materials, almost, even, to the exclusion of gold; but I believe that such radical use of porcelain as has been practiced for several years is a mistake.

I believe the handwriting on the wall at this time shows the beginning of a more conservative use of porcelain inlays; at least we have heard this mentioned within a year by more than one of the best porcelain inlay workers, "It is now generally conceded that large restorations with porcelain are not wise practice." When questioned as to the cause of the change in this respect, it was said that porcelain would not hold; it was too brittle in these large restorations. The question has been frequently asked, "Where should porcelain be used?" We have seen the answer in print from more than one practitioner, namely: "Where it does not come in contact with the occlusal surfaces." That porcelain has its place and that porcelain work is being used skillfully and to advantage we do not dispute, but it has been carried to a much greater extreme and has been much longer-lived than we had ever dreamed it would be. I predict that a much more conservative use of porcelain will be adopted by practitioners generally in the near future and that gold will again occupy the most important place as being the best filling material, and that porcelain will take a second place with wise practitioners. I believe that history will again repeat itself; that after a brief season longer of experimentation we shall return to the methods of former years which were so thoroughly tested and which gave such satisfaction and such lasting results to patients and practitioners alike.

In this limited review of dentistry in the past, of its equipments and methods, I have limited myself to those changes only which were of greatest importance to the entire profession. In the presence of this great Society, as one of its founders, I wish to congratulate and express my heartfelt gratitude to the committee on organization upon the great work they have accomplished. It gives me extreme joy to see so many of the profession of the state united together and working so harmoniously. I know what this society has done for me and the beneficial influence which it has had upon many others here present. I think I can estimate what this organizing of the dentists of the state will do for the entire profession, for its influence for good will not be limited to Illinois.

In fact, in perfecting its own organization, in setting its own house in order, it has quietly, unostentatiously, and doubtless unconsciously, set an example of numbers, of harmony and good-will toward one another which cannot but have its effects upon the profession at large.

As I have been renewing in memory the incidents and events of the past while writing this paper, a vast number of familiar faces and forms have been recalled, men whom many of us have known and loved; men who helped to organize this Society and who gave faithful service to it for many years. They have passed to the other shore of the river we call Death. Shall we say they did not live to see the fulfillment of that which they so desired and which we now see realized? Or, rather, shall we not believe that these liberated souls, with their enlarged vision, see and rejoice in all that has been accomplished; and while absent from us in body, they are with us in spirit, with their added wisdom and insight influencing and inspiring us to still greater achievements. If this were not true, then creation would be a failure, and we know it is not.

In conclusion, I wish to pledge my support anew to any part of the work which will further the interests of this Society in its onward march.—*Dental Review.*

ORAL PROPHYLAXIS AND THE DENTIST'S PREROGATIVE. By T. S. Luckie, D.D.S. The problems associated with the cause and prevention of disease are being studied by investigators in laboratories and hospitals, and by those engaged as clinicians, at the present time more than in any period of the past of which we have positive knowledge. Books and brochures are being launched upon the market for sale to the public for their enlightenment regarding the maintenance of health and the treatment of all the ills of the economy; many advocating the exercise and diet fads of the authors; others presenting the deductions of scientific thought and work, and all, perhaps, containing grains of truth worthy of consideration and adoption, and followed by beneficial results when they meet the requirements of individual conditions.

Laws are being enacted to enforce hygienic conditions in public places and vehicles for animal transportation. The plumbing, flooring and many items that go to make the conveniences and

decorations of the home desirable are receiving the attention that the present knowledge of sanitary science suggests. The food and water supply is also receiving similar attention, to the end that the public may be protected against zymotic diseases. This denotes a moral atmosphere, and emphasizes the fact that the time has arrived when measures all along the line for health protection must be instituted and the great and good work of preventing disease systematically carried on.

The oral cavity being a habitat of pathogenic organisms, the frequency of reflex disturbances due to lesions of the teeth and gingivæ, while adjoining regions become the seat of disease from continuity of structure, are sufficient causes for alarm, and for the adoption of a system of oral prophylaxis which may render not only the teeth and gums a less easy prey to disease, but promote a consideration of the subject as an important part of preventive medicine. When dentistry shall have accomplished this it will, by the humanitarian act, be advanced to a higher professional eminence. For this reason the dentist's prerogative is made a part of our discussion.

The mouth has been sadly neglected by all classes, some desiring a clean mouth, though perhaps lacking in the knowledge of how to obtain it, while others are indifferent and never perform the act of oral ablution. Many persons who daily cleanse the external surface of the body, filter and boil their drinking water, eschew the oyster as a viand and who, perhaps, are interested in pure food laws, will often possess mouths with tartar accumulations, cavities in the teeth and other receptacles for food and effete material from the mucous surfaces, thereby making excellent culture fields for microorganisms.

How much the dental profession is culpable in permitting ignorance of oral hygiene to be prevalent cannot be computed, but a fact is apparent that a condition exists which makes it a prerogative of the profession to investigate its effect upon the natural functions of the physical economy, diffuse the knowledge thus obtained, and remove, by all available means, the disturbing factors.

A few years' experience in practice will impress upon us the improvement that frequently follows the successful treatment of diseases in the oral cavity. This, with the moral effects of a clean

mouth, makes the teaching and practice of oral prophylaxis an ethical and altruistic consideration, and, if not a part of the daily work of the dental practitioner, an evidence that every pregorative has not been exhausted to fulfill the highest conception of our calling.

To call public attention to a moral and physical necessity education must precede and coöperate with reformatory work. The education and work fittingly belong to those closely associated with the conditions needing reform and who are cognizant of the need and of methods for its attainment. When a calling recognizes its capability for such an undertaking, and at a sacrifice of time and thought secures results beneficial to the body politic, the action becomes altruistic in practice and is justly entitled to be classed as professional in the highest sense of the term.

It has been said that the first law of life is preservation of self; the second and higher law the preservation of others. Every occupation in life that has for its object the production and transferring of those things necessary for the welfare and comfort of society, has opportunities to help others beyond mere selfish and pecuniary desires.

The practice of dentistry is to relieve and prevent suffering and to maintain health and function for at least a part of the physical economy. It thereby becomes a factor in promoting the welfare of society, the value of which is so great and incomputable that it can be reckoned as one of the noble callings. The dentist, therefore, is fulfilling the highest conception of his profession in solicitude for his patient's welfare, and not only ministers to his immediate needs, but directs attention beyond the five surfaces of the teeth.

Our art and skill in making the masticating apparatus useful by filling carious cavities, placing crowns on crownless roots and bridges in spaces does not fulfill the requirements of an altruist intent, unless the operations are performed in a manner which will allow the greatest possibility of easy cleansing and avoidance of irritation by food impaction. Important, also, are the removal of tartar and stain, the treatment of tumefaction of the gums and the recognition and treatment of whatever lesions or deformities may exist within the oral cavity, accompanied with such instruc-

tions as experience and study bring to one's aid, so as to sustain as near as possible an oral condition that will not only make it less liable to again require extensive dental operations, but, perhaps, prevent lesions, the cause of which may be obscure to other specialists or the general practitioner. It is this manifestation of such altruism that will give caste to our profession, and to the dentist who practices it, a remuneration above money value in the satisfaction of helping those under his care to acquire bodily health.

To one who takes up the study and practice of oral prophylaxis a bright and enticing field is opened that widens before the mental vision; the powers of observation become more alert, conditions being recognized at a glance that before were unnoticed. Patients become interested and appreciate the importance of a healthy mouth; the character of the clientele is improved, both among old patients and those seeking service for the first time. Remuneration is less a subject of discussion and a mutual interest is established between practitioner and patient to eliminate to the greatest possible degree the causes of oral lesions. The altruistic spirit is quickened, the standard of our profession advanced, and the mutual feeling between employer and employed extended to the general public and glimpses seen as to what the true position of dentistry should be in the eyes of the world.

While the history of oral lesions extends far back toward the advent of man, comparatively little attention, until recent years, has been given to their causes and prevention. The medical profession has not deemed the subject an important one, and thereby has missed an opportunity to explain the obscure causes of many ills that are in the province of its members to treat. The dental profession has been busy establishing a separate profession and repairing by art the ravages of disease. Having established a profession and neared perfection in reparative art, it seems opportune that the next great undertaking should be the prevention of oral infection and disease.

We have a duty to our patients, and there is also a duty we owe the community of which we are a part, both as dentists and citizens, and it should be performed in a manner to guide and in-

fluence public sentiment. Our community of interests has fostered the organization of dental societies and by such, knowledge, acquaintance with and interest in each other have been engendered. But there is still another consideration as to the use of a dental society—namely, its influence in the education of the community. The physician as a citizen is interested in sanitary matters, in milk supply, food inspection, sewerage, immigration, water supply, and the care of the dependent and defective classes, and his superior knowledge renders him a valuable colaborer with philanthropists in the betterment of these matters. Why, then, should the dentist, the physician to the mouth, be silent when he is aware that oral pathologic conditions are associated with lesions in other regions of the body?

To intimate a lack of duty should, perhaps, be followed with suggestions of a mode of action. What action as a profession might be taken to educate the public and direct the attention of those who are working for better hygienic conditions, may well be a part of the work of the several local, state and national societies. If they are aroused to the importance of such an undertaking the avenues by which education can be diffused are already open: Properly written books for schools on the care of the mouth; its importance explained in family periodicals also, and the individual interest of dentists in public hygiene; for the physician the Section on Stomatology of the American Medical Association. Should our profession take a greater interest in this section medical practitioners would be more impressed with our work as colaborers in combating disease.

The local society, with its frequent meetings, has within it possibilities for the advancement and elevation of dentistry and the mutual improvement of its members. All of our societies, I believe, have this purpose. To what extent they fulfill the object may be a question for discussion.

An organization of dentists in a large city, with its associated educational advantages, composed of many members of ability as students and investigators, and in the possession of permanent quarters, could more effectually fulfill the objects of its organization if facilities were installed by which members could make tests and conduct experiments.

The surgical treatment of the mouth has been a theme for essays and discussion for years; beyond the objective condition the mouth has received but little attention until the presentation of sialo-semeiology by Drs. Michaels and Kirk.

What do the majority of us know of the chemical action going on within the mouth and how it is produced? Should we not have more intelligent understanding of the oral secretions and their effect when abnormal upon the tissues within the oral cavity and elsewhere and in what manner their abnormality is produced? If oral secretions are important in the discussion of the causes of diseases, dentists should institute means by which they can be studied and thus become intelligently familiar with the conditions that influence their change and make them detrimental to health. As laboratory work with its technique is the most thorough way of impressing facts upon the mind, it would seem that our organization might institute such means of advancing and elevating dentistry and thus imbue many with interest in furthering the work of oral prophylaxis.

The study once originated would permeate the profession and be reflected to the public, as improved methods of filling, crowning and bridging have in the past. This advance would be the crowning step of dentistry, attract to it educational recruits and, as have the other advances, create a demand for a more extended course of instruction in our colleges.

Thus far our success in dentistry is measured largely by the ability to cope with advanced diseases of the teeth. May the time be not far distant when the importance of recognizing the antecedent pathology of caries, erosion, pyorrhea alveolaris and pericemental abscess be impressed upon the profession and the public be educated to choose preventive rather than operative dentistry.

The fathers of dentistry had their duties, responsibilities and opportunities; we have ours. They initiated means and methods to advance dentistry, overcame difficulties and achieved their triumphs; we should strive to do likewise; and when in years hence the history of dentistry is written let us hope a chapter may be read, not of the long list of brilliant operative procedures made possible by ingeniously devised instruments, but as a record of the more substantial blessings and benefits accruing to man-

kind through oral prophylaxis and also as a tribute earned by systematized and zealous efforts to dentists of the early decades of the twentieth century.—*Dental Brief.*

PRINCIPLES INVOLVED IN CAVITY PREPARATION FOR CONTOUR PORCELAIN INLAYS. By Thos. P. Hinman, D.D.S., Atlanta, Ga. The subject that I present for your consideration is one which has proven the stumbling-block of many operators in the field of porcelain. To say that I have solved it is a claim that I would not for a moment have the presumption to make. However, I will try to present some of the ideas that have proven satisfactory in my own practice, in the hope that you, profiting by my experience, may bridge some of the difficulties that are sure to present themselves in your daily practice at the chair. It is well-nigh impossible to lay down any set of rules that will cover all cases or that are applicable, except in a majority of instances. I will try to make clear to you what I believe to be the best form of cavity preparation for contour porcelain inlays.

The Floor.—The first general principle which I wish to lay down is a correct mechanical one, and that is the production of a flat floor, or to elucidate, a basal wall that is at a right angle to the long axis of the tooth. This is in contradistinction to the sloping basal wall or "toboggan slide" formation that is so frequently used at this point. To produce this flat floor, a square-end fissure bur is used, being held during the process of cutting in a line with the long axis of the tooth. This will produce a firm foundation, on which the inlay is to rest. In the floor or basal wall is cut a broad, shallow groove, this groove running labio-lingually. It is not necessary or expedient to cut this groove deep, as it is impossible to burnish the matrix into such a formation. Then, too, a deep groove weakens the foundation for the inlay and invites fracture of the tooth at this point.

The Lingual Enamel.—The force that tends to dislodge the filling is from within, outward; therefore, we should construct the cavity in a manner so that its greatest resistance would be from without, inward. To do this, we must cut away the lingual enamel to a greater extent than the labial, thus producing a lingual lap

of the inlay, giving a joint that is far stronger than a butted one, as is confirmed by the following illustration:

If a carpenter wishes to join two pieces of scantling he does not butt the ends and try to hold them together with nails or glue, but laps the point by beveling each piece. The longer the lap, the stronger the joint. Just so it is with the inlay—the greater the amount of surface in contact, the stronger the joint; provided these surfaces in contact are properly formed.

The Labial Enamel.—The labial enamel should be beveled from within, outward, so that a lap joint will be produced where the porcelain comes in contact with the tooth. The actual margin of the labial enamel should be practically trimmed to a knife edge, as such a joint will show practically no cement line; whereas, if a butted or square joint be used, the cement line is very much more apparent. To trim the labial enamel to such a finish, a cuttle-fish disk may be used in the engine, holding the disk at such an angle as will produce, in cutting, the desired effect.

The Incisal Joint.—This joint should be a diagonal lap, the linguo-incisal enamel being cut away to a greater extent than the labio-incisal. The lower third of the labial enamel must be at right angle with the line of the incisal surface of the tooth. This is done to prevent, so far as possible, fracture of the inlay or enamel at this point. The lap has proven far stronger than the old butted joint, and I have had, so far, no fractures of porcelain or enamel at the point where this form of preparation was used.

A Few Closing Remarks.—So much has been said about etching, and so little attention has been paid to the technique of this most important of all the steps in the preparation of the inlay for cementation, I feel that to add something on this line in the shape of addenda would not be out of place, although it is not in keeping with the title of the paper.

Whenever possible, the inlay to be etched is first ground with a very small diamond disk or very thin rubber and carborundum wheel. Then invest the inlay in wax, covering all the parts that are to be kept from the acid. This I have best accomplished with a warm, flat burnisher which is run around the margins of the inlay so as to heap up the wax at the points desired.

Place a drop of white hydrofluoric acid on the inlay and allow to etch five minutes for a small inlay and ten minutes for a large

one. Wash off the acid with water and immerse the inlay in a saturated solution of bicarbonate of soda, allowing it to remain in this solution for at least fifteen minutes. If you do not neutralize the acid it will keep on etching after the inlay has been set. Remove the inlay from the soda solution, wash in water and dry thoroughly. The etched surface will have a white appearance after being dried; this, you will think, is just what you want; but if you touch it with a fine excavator you will find this white surface to be a fine powder, which is dissolved porcelain. This must be removed before the inlay is ready for cementation. I always scratch off this dissolved porcelain with a fine excavator before I attempt to set the inlay. When an inlay has been set, tie it in with ligature silk, using the first tie only of a surgeon's knot, clipping off the long ends to prevent their being in the way of the patient. Philip James Baily says:

"The value of a thought cannot be told,"

so I give these few thoughts to you, with the hope that they may in some degree, at least, prove of value.—*Dental Brief.*

THE IMPORTANCE OF PRELIMINARY EXAMINATION OF THE NASAL CHAMBER IN THE TREATMENT OF DENTAL IRREGULARITY. By Francis Ashley Faught, M.D., D.D.S., Philadelphia, Pa. The frequency of deformity in the dental arches, particularly that condition known as contracted arch, in conjunction with obstructed respiration, due to reduction in the respiratory space within the nasal chambers, and in the naso-pharynx, has been very forcibly impressed upon me during the past few years in my work in the Hospital Dispensary and during the examination of children for admission to a day nursery.

If we consider the mechanical forces active in the production of the contraction, we cannot fail to realize the importance of taking into account the frequent coincidence of these two conditions. This surprising frequency can hardly be considered pure accident, but is suggestive of a probable relation between the two conditions. This probability is advanced almost to a certainty, when from a physiologic standpoint we consider the mechanics of the muscle forces incident to nasal obstruction and the resulting mouth-breathing.

During quiet nasal respiration the lips are closed, the teeth of the opposing jaws are in contact, and the tongue closely applied to the palatal vault and to the inner aspects of all the teeth. In this position the muscle forces are in a state of equilibrium, by which the teeth are maintained in their proper relations one to another. The muscles of the tongue on the one hand and those of the lips and cheeks on the other, exert equal pressure upon each side of the dental arch.

In the presence of nasal obstruction and the resulting mouth-breathing the mandible is depressed, increasing the tension of the tissues and muscles of the cheeks, the lips are parted and the tongue separated from the roof of the mouth and from contact with the inner aspects of the teeth. In this position the normal equilibrium is disturbed and unequal forces are brought to bear upon the teeth and the dental arches.

The logical result of this disturbed equilibrium follows. From lack of support on the inside and increased pressure from without, the tendency of the bicuspid and molar teeth is inward. Simultaneously pressure is brought to bear upon the anterior teeth, as a direct result of the lateral contraction, and in the absence of normal restraint from the lips, the anterior teeth advance and result in protrusion.

When we further consider that these forces are active, even in moderate degrees of obstruction, for at least one-third of the twenty-four hours, the strength of this power becomes evident, while in those cases where nasal respiration is impossible, and the disturbing force is continuously active, we are brought to realize even more forcibly the strength of the distorting power with which we have to deal.

Under these circumstances all efforts directed toward correcting the oral deformity will be constantly antagonized, both during the period of active treatment and subsequent to the removal of all appliances from the mouth. The result under these circumstances will in many cases be failure to attain a permanency, the extent of return of the original condition depending upon the degree of nasal obstruction and the age of the patient, it being greater in cases of marked stenosis and in young children.

Nasal Examination Recommended.—This brief consideration of the state of affairs existing in many cases of contracted dental

arch, indicates the importance and value of recognizing the probable co-existence of intra-nasal deformity and obstruction in many, if not in all, cases of dental irregularity.

I believe from the standpoint of the rhinologist, that it is not going too far to state that a thorough intra-nasal examination is indicated and should be required in all cases presenting oral deformity, and that the time has come when all who undertake the correction of irregularities of the teeth should be familiar with the anatomy of the nasal chambers and with their gross pathological changes, and should possess a working knowledge of the signs and symptoms of these conditions. For it is only by aid of this knowledge that he will be able to detect their presence, to note the frequence of this coincidence and to realize the importance of their relation.

It is not too much to expect the competent practitioner of dentistry to be able to test the functional capacity of the nose in patients presenting for treatment, and to question the patient or parent concerning possible disease within the nose. Such data can be gathered in a very few minutes, and, properly used, will quite accurately determine for or against the necessity of preliminary treatment at the hands of the nose and throat specialist.

The occurrence of even a single one of the recognized symptoms of nasal obstruction should be enough to arouse suspicion and call for a thorough examination.

Symptoms of Nasal Obstruction.—Briefly enumerated, the signs and symptoms to be looked for are as follows: Most frequent and most characteristic is *mouth-breathing* during all or part of the time, with *noisy respiration* or actual *snoring* at night. *Restlessness* during sleep with a tendency to *awaken* and call for water to relieve the extreme *dryness of the mouth.* Advanced cases will show a *characteristic face,* easier to recognize than to describe, with *blunted mental activities, backwardness* at school, from no apparent cause, and more rarely a history of *nocturnal enuresis,* or *night-terrors,* may be developed. *Chronic cough,* which is slightly productive and which becomes worse in winter and during periods of damp weather, is present as a rule.

As already stated, a knowledge of the fundamentals of rhinology, so far as anatomy and symptomatology go, will prove of great value to the dental practitioner who is active in the field of

orthodontia. Such knowledge intelligently applied will surely add to his measure of success in this particular field of dental science.

The difficulties in the way of acquiring such a knowledge are not great, but are within the reach of all who are willing to study and investigate this important and fascinating branch of medicine. —*Items of Interest.*

THE DIET FACTOR IN THE HIGHER EVOLUTION OF MAN. By Alexander Haig, M.D., London, England. It may easily be that some will dispute the relevance of the title I have chosen for this article. The consideration is a modern one, but we see the full importance of this factor if we remember that diet controls the circulation, that the circulation in the brain controls the mind, and that the mind controls man's being and doing from the beginning of life to its close.

My first proposition, then, is that diet controls the circulation. This may be demonstrated to any observer in a few moments as the rate of the circulation is visible and can be measured. Simply press one finger on the back of the other hand till a white spot is produced, remove the pressure and note the rate at which the color returns. Let us say that it is slow as eight or nine half-seconds. There is, then, an excess of uric acid in the blood and the capillary circulation is unduly slow in consequence of this obstruction.

Now let the blood be cleared of some part of its excessive uric acid by the administration of something that will form an insoluble compound with it, *e. g.*, mercury, and in the course of an hour, or it may be sooner, the blood is partly cleared of the obstructive uric acid and the capillary circulation quickens in consequence. The white spot made as before will vanish in about five or six half-seconds. The blood then is circulating freely. But this is only a temporary clearance, and when the action of the mercury ceases there is as much in the blood as formerly and the capillary circulation is as before, slow. While the mercury was clearing the blood you felt bright, active and clear-headed, and right diet achieves this end better than a drug, and not for an hour or two only but for days, weeks, months and years, since it diminishes the daily turnover of uric acid by one-half. You

have only to deal with 10 grains a day on the uric-acid-free diet as against 29 grains on one containing meat and tea, and on the former diet the capillary circulation is therefore always quicker and less liable to fluctuations. Hence, diet controls the circulation and the circulation in the brain controls the mind, for it is demonstrable that you felt bright and cheerful while the mercury was acting, and this is the universal experience. That the mind controls man needs no words of mine as proof; this has been common knowledge throughout the world's history.

The life of man has been likened to the climbing of a mountain. At the summit are truth and love. It stands in the blaze of the sunlight of truth and of the warmth and glory of love. The middle mountain is that part where the mind (reason) begins to assert its ascendancy over the brute. In the jungle at the foot of the mountain man and beast snarl together over the bones and garbage, and disease and selfishness mingle and produce their inevitable result of sorrow and sin, while overhead, unheeded, unseen, shine the remote stars of love and truth.

Diet gives man control of the body and its passions, and thus eventually develops the full growth of reason. The human race prefers to expect miraculous improvement and despises the gradual, but life is an evolution under fixed laws.

> "Beauty still lies imprisoned, and iron wheels go over the good and true and beautiful that might spring from human lives."
>
> "Taking men in the aggregate, their condition is as they make it; we see that economic law and moral law are essentially one."
>
> "So far as we can see when we view things upon a large scale, justice seems to be the supreme law of the universe." *Henry George.*

And psychological law is one with all others. Man suffers only because he errs, and instead of arraigning heaven and blasphemously attributing his self-wrought evil to the all good, he should use his reason to divine his error and to find the better way. God is the God of the mountain summit, and when man has suffered enough he will see the stars and begin to pierce his way through the jungle which hides the first steps of the ascent.

It is now known that three-fourths of our so-called "diseases" are the results of ignorance and folly, and with more life and more light probably the other one-fourth will be seen to be the same. Evil is a stage in the evolution of good. Do good and you will receive good; do evil and evil will be your reward. This is the great law, and none, neither nations nor individuals, escape it.

Henry George discovered that friction (inequality) in the social machine meant lessening progress, ending in eventual retrogression and decay. He thus declared a universal law and demonstrated that it is the injustice of man and not the niggardliness of nature that creates our poverty and despair. I add to this the declaration that friction in the human organism has a similar tendency towards degeneration and that natural food removes this friction and its results. The matter need only be stated thus and it becomes obvious that both causes of friction are unnecessary, for correct diet practically removes the one and greatly lessens the other, since it makes man less ferocious, grasping and selfish. It was an observation of Byron's that meat-eating made man ferocious; and I, as a teacher of diet, have much corroborative evidence from the tongues and pens of more ordinary mortals tending to show that life is more pleasant, temper and friction are diminished, and mutual aid and the happiness of families are all greatly increased by resumption of more natural foods. I have no doubt that what is true of the family is true of the race also, and so doubtless in some future happy age "Evil shall cease and violence pass away."

The clouds vanish into thin air and the mountain summit is revealed as the goal of human endeavor, if friction, retrogression and decay are not inevitable evils. For selfishness and greed are also diseases and will drop away into the unhappy past in the evolution of man. The empires of the past have not decayed without reason, but in the working of law because they were founded on injustice, and injustice is compound of death.

"Where empires towered that were not just,
Lo, the skulking wild fox scratches in a little heap of dust"

Man has in him the instinct of ascent; that which will nerve him for the climb and render all earth's prizes valueless beside the crown that awaits him at the summit. Therefore, while he has hoped for some miraculous intervention he had only to look

within, to evolve, to open up, for the germs of truth and love are sown there for a harvest which will ripen; and here his natural food will help just as his unnatural food has hindered. For right living conduces to reason and to all the higher elements of thought that conduct human nature to its utmost possibilities.

"Do you hear the children weeping, O my brothers—
They are weeping bitterly."
"They are weeping in the playtime of the others,
In the country of the free."

—*Mrs. Browning.*

This is the voice of the wanderers in the jungle, where the children of the poor and the children of the rich are alike miserable, the one surfeited in luxury and losing the power to work at anything, the other starving and in need of the commonest necessities, and both embracing an absolutely false view of life, believing in nothing but luxury and self-indulgence, the one because they have too much, the other because riches seem to them the unattainable good.

Surely these are getting the worst and least from life, and a very small exercise of reason is required to make the conditions more hopeful for all. The boast of freedom is a mockery, for where all are slaves to wealth and luxury or to the longing desire for it, none is free; and yet the attendants of wealth and luxury are ever sorrow, decay, poverty and death.

Man is undoubtedly a frugivorous animal, and in surrendering his birthright in the natural foods and wandering after flesh and stimulants he has endeavored to outwit nature and has reaped a terrible harvest of disease and misery in consequence. A natural diet eventually brings about natural circulation, and natural circulation in the brain cures the disease of "selfishness" and purifies and ennobles the mental outlook. Reason serene and unclouded is the instrument with which man will one day fulfill his destiny and hew his way from the stifling tangle of undergrowth to "the higher sunlit slopes of that mountain which has no summit, or whose summit is in heaven only."

Racial evolution has a triple foundation in justice, truth and love; and right living, especially as regards food, is connected chiefly with the central stone of this foundation, but is also related

to the other two; for it is the negation of love to slay our fellow creatures, and it is injustice to make others do for us what we shrink from doing for ourselves.—*The Dietetic and Hygienic Gazette* (*Dentist's Magazine*).

ETIOLOGY OF ACCESSORY SINUS DISEASE. By Fayette C. Ewing, M.D., St. Louis, Mo. The accessory sinuses include the frontal, maxillary, ethmoid and phenoid. The causes of their diseases may be classified as common and special.

Common, as applying to such factors as are productive of disease in each and all; special, as bearing upon the pathology of one or more, but not all. Their classification has been hit upon for the sake of brevity and in the belief that it will enable my hearers to carry in mind the essential and most important of the contributory causes of those diseases to which these cavities are subject, thus elucidating the diagnosis and treatment, which will be ably discussed by my successors in this symposium. Furthermore, in emphasizing the causes common to all, by placing them together, I may hope to impress the general practitioner with what may be most serviceable hereafter in his hurried life.

The constant accompaniment of all sinus disease is *inflammation*. But inflammation is a condition, not a cause. To name inflammation as a disease and to direct against it our therapy would be to violate the basic principle of all therapy, which aims at the removal of the cause. Inflammation, then, though it must be reckoned with in diagnosis and treatment, is secondary, though indissoluble from any consideration of the etiology of sinus disease. Inflammation in the sinus may arise, and most frequently does, from a like condition in the nasal chambers. It may have its source in a simple rhinitis, by extension, since the lining membranes of the sinus are continuous with that of the nasal passages. The strumous and tuberculous diatheses, rendering the individual more subject to rhinitis, become influential in the greater liability to sinusitis, both through frequency of rhinitis and in the special susceptibility of the sinus membrane. Pyogenic microorganisms, operating in the nasal passages, may infect these cavities by continuity and contiguity of tissue or by direct lodgment. Doubtless many unclassified germs, of which the nose

is full, play a part in cases in which the etiology is obscure. The exanthemata, diphtheria and atrophic rhinitis must be considered as causative of such suppurations. Metastasis and actinomycosis may, though very rarely, account for them. Worms and insects may find their way into the innocent body of the sinus, after the manner of original sin, acting as the first offense. Foreign bodies and microorganisms may be washed in by the douche or blown in by the inflator. It is not uncommon for syphilitic necrosis to be set up in the sinus or find its way by extension. The same disease process may occasion sinus disease by dislodgment of bone adjacent to the outlets, blocking the passages. Various malformations, interfering with drainage and the circulation of air, tend to produce inflammatory process. Obstruction, from whatever cause, is one of the most potent of all factors in the development of inflammatory conditions. Other causes of obstruction than those enumerated are hyperplastic rhinitis and tumors, such as myxomata, fibroid and osteomata.

The condition known as mucocele may be formed in any of the sinuses, and it is due to prolonged catarrhal inflammation, resulting in cell proliferation and the formation of a myxomatous mass inclosed in a thin sac. It is of infrequent occurrence. It is possible for systemic poisonings from minerals and metals to affect any of the sinuses.

Having enumerated the known causes of disease in all the sinuses, I shall now take them up separately and dwell more particularly upon the etiology special to one or more, but not to all four.

From a pathological point of view the most important is the maxillary sinus. Owing to its peculiarities and eccentricities of construction and anatomical relationship to adjacent parts, it is the one most frequently subject to chronic disease. It is a closed cavity except for one, sometimes two, small openings near the top, which lead into the middle meatus of the nose. These openings are named *ostium maxillare* and *ostium maxillare accessorius.* Catarrhal accumulations in the antrum can find no natural outlet except by overflow through these passages, and when this occurs there must of necessity be retention almost equivalent to the capacity of the cavity. Sometimes these openings are situated abnormally high, even above the level of the floor of the orbit.

The position of the *ostium maxillare* is in direct line with the drippings of pus from a diseased ethmoid or frontal sinus, the downflow from which easily enters into the antrum, setting up disease therein. Even if the pus does not find its way into the antrum, it acts as an irritant to the mucous membrane lining the small opening of and about the *ostium maxillare,* producing turgescence and obstruction, with a resultant sinusitis. The antrum is subject to great variations in shape, differing materially on opposite sides in the same individual, sometimes adding to the difficulties of drainage. It is by no means smooth within, the line of molars projecting well up into the floor, while the superior dental nerves and vessels traverse the spaces to their distribution. Where branches of the superior dental nerve sometimes pass over the floor, the mucous membrane is exceedingly thin, which explains the excruciating pain sometimes experienced in comparatively slight accumulations of fluid. Perhaps the teeth should be reckoned the most frequent single cause of antral disease, and it behooves the practitioner to look well to them. If he has not a thorough knowledge of their anatomical relationship to the antrum he should seek advice. A decayed root or obscure snag may be creative of much mischief. It is possible for foreign bodies to find their way into the antrum, which when once in are naturally retained.

Emphysema is sometimes set up in the antrum, and though it is a rare affection, when present it is of much importance. It is caused by the generation of gases by decayed teeth. From the teeth may also arise the so-called dentigerous cyst. Other cysts may develop from the enlargement of the follicles lining the cavity.

In the frontal sinus none of the causes of disease to which I have alluded are as important in children as in adults. Before the twentieth year, since the cavity is not fully developed, the prominence of this sinus renders its walls particularly susceptible to compound fracture, adding to its possible injury and obstruction over the others. On the other hand, its position, with natural drainage from the bottom, saves it from suppuration, which often would otherwise occur. It is frequently attacked by the catarrhal process, in connection with rhinitis, which proceeds no further.

In connection with the ethmoid sinus, there is little to add to

the aggregate of etiologic factors mentioned in my general summary. However, some consideration of its peculiarities of anatomical construction and regional relationship should be accorded, adding to its individual susceptibility from causes that may also operate in the pathology of the others. The ethmoid cells anteriorly may be bathed in the pus from the frontal sinus, while the posterior cells, by their proximity to the sphenoid sinus, may be similarly affected in disease of this cavity. Under certain conditions, pus from the maxillary antrum may penetrate into the anterior cells; all of which explains the obscurity of symptoms when only one of the other three sinuses is suspected as their source. Obscure, offensive and obdurate discharges that have been diagnosed as rhinitis are in reality due to suppurating ethmoiditis. The pronouncedly cellular formation of the ethmoid renders its mucous membrane very thin and closely connected to the bony framework, making it more susceptible to injury and catarrhal disease than the kind we usually have to deal with. Furthermore, the construction is such that pus is not freely discharged from the honeycomb-like chambers. Basal fracture of the skull may involve the ethmoid, while a blow on the nose may fracture the vomer, loosening it from its connection, with injury and exposure of the cells. Violent intra-nasal operations, particularly upon the septum, may produce a like result. Phosphorus poisoning has been known to center upon these cells.

The sphenoid sinus has no etiology of disease peculiar to itself. All causes leading to inflammatory conditions in it have been mentioned in my general classification. Situated as it is in the center of the head and far from the possibility of direct exposure, its disease is almost always secondary and, by extension, following disease of the other sinuses; or in the nasal or post-nasal spaces pus may gain entrance by rupture of the wall separating it from the ethmoid sinus.—*Dental Era.*

LUDWIG'S ANGINA. By Dr. Charles C. Cuthbert. Cases of Ludwig's angina are not by any means rare, but their occurrence is at least uncommon enough to cause most of them to be reported in the various journals. The condition is the result of a pyogenic infection of extraordinary virulence, occurring in the submaxillary region, and generally commencing in the cellular tissue, between

the mylohyoid and geniohyoglossus muscles. The suppurative process may affect one or both sides of the neck, and takes place entirely under the deep layer of the cervical fascia, extending in conformity with the distribution and attachments of this layer.

The first accurate description of the condition was given by Ludwig in 1836, and after him it has been named. Previous to that, however, a case was noted by an English surgeon, Dr. Kirkland, under the name of "angina externa," and in 1809 another English surgeon, Dr. Wells, described "a case of extensive gangrene of the cellular membrane between the muscles and skin of the neck and chest," which seems to fall into the same category.

At the time when Ludwig first published his cases it appears to have been almost epidemic in Germany, and his article was followed by the publication of several cases by other medical men. Since that time the condition has been more or less recognized as a separate disease, although, no doubt, it does not deserve that position, but it is merely a suppurative condition which owes its peculiar characteristics to the conformation of the part in which it occurs. Thus its classification as a disease *per se* is distinctly artificial, but it seems even more so when one considers that Ludwig only included those cases where the primary lesion was so slight as to be almost negligible, and where the spread of the infection was by direct continuity and without marked involvement of the lymphatic glands. That is to say, he excluded such conditions as inflammatory edema and pyogenic infection resulting from a cut-throat wound, or a sloughing condition of the fauces with glandular abscess in the neck.

In a typical case the origin of the illness is obscure. The predisposing cause is general debility, in some cases occurring after influenza or one of the exanthemata. The exciting cause is the presence of a pyogenic microorganism in the cellular tissue of the neck. The microorganism gains entrance through the mucous membrane of the mouth and pharynx, but in most instances it is impossible to tell the exact site of the original lesion. In my case the patient complained of a slight "sore throat," and out of seventeen comparatively recent cases which have been recorded, in three the primary complaint was of toothache, in one a fish-bone had stuck in the pharynx, while in thirteen the onset was described as

spontaneous, which probably means that the lesion in the oropharynx was so small as to escape notice.

The microorganisms in penetrating the mucous membrane of the mouth cause few symptoms, and it is only when they have reached the loose connective tissue surrounding the submaxillary and sublingual glands that they give rise to the signs and symptoms characteristic of the condition. The patient at first complains of a feeling of lassitude and chilliness with raised temperature. In three or four days a hard swelling makes it appearance under the ramus of the jaw on one or other side, and rapidly extends backwards to the angle of the jaw, downwards toward the clavicle, and round to the corresponding parts of the other side of the neck. The swelling, which is generally extreme, tilting the chin upwards and the head backwards, is tense and brawny, with little reddening of the skin, and it is seldom that fluctuation can be made out. On examination of the inside of the mouth, which by this time can only be opened with difficulty, a continuation of the swelling can be seen underneath the tongue, elevating the tip of the tongue to the hard palate and rendering it impossible for the patient to protrude the tongue from the mouth. This is generally accompanied by great discomfort in breathing and swallowing.

On making an incision into the affected area through the deep cervical fascia the connective tissue round the salivary glands and between the different planes of muscle is found to be sloughing, of a grayish-black color, and infiltrated with very foul-smelling pus which stains gauze black. Although in the later stages definite collections of pus may be found, in the typical case there is rather a general oozing of pus from the surfaces of the incision than any localized abscess cavity.

The absence of enlargement of lymphatic glands is noteworthy, infection being principally by direct continuity and not by the lymphatic system.

The suppuration is limited in its extent by the dense layer of deep cervical fascia which is attached to the ramus of the jaw above and to the clavicle and sternum below, but it is frequently accompanied by a marked edema of the face and also of the upper part of the chest wall. Should the condition remain untreated and the patient not succumb to general septicemia, the large abscess which ultimtely forms may rupture, either into the pharynx or

further forward at the junction of the tongue and the floor of the mouth, or into the external meatus.

Of the complications which may occur pneumonia, septicemia and pyemia are most to be dreaded. Dyspnea frequently causes great distress, and is due in some cases to edema of the glottis, in others to direct pressure on the trachea or vagus. Pressure on the jugular vein gives rise to symptoms of cerebral congestion, and in one case disturbances of vision, and prominence and tension of the eyeball with inability to completely close the eyelids, was explained by alteration of pressure in the jugular vein. In one patient operated on by Mr. Ballance thrombosis of the jugular vein was noted. Occasionally paresis of the facial muscles has occurred on one side of the face. The effects of pressure, combined with the action of the toxins, caused the skin on the whole of one side of the neck to slough in one case (Häfer), and in the same case the parotid and submaxillary glands were gangrenous. In a post-mortem examination by Ludwig the periosteum of the lower jaw was found at one place to be detached and the bone bare and discolored. As one would expect, abscess of the anterior mediastinum is not an uncommon complication.

According to Ludwig, in spite of his treatment, which consisted of fomentations, bloodletting, administration of mercury, etc., the result was invariably fatal. Leterrier, in 1893, published thirty-one typical cases, of which only thirteen recovered; of the remainder the majority died within a few days of the commencement of the disease, and the rest succumbed later from general sepsis. In later years, probably owing to more vigorous treatment, the results have been much better.

The present-day treatment consists of free incisions through the skin and deep cervical fascia of the part of the neck affected. It has been advised that the incision be made vertically in the middle line, between the lower jaw and the hyoid bone, in order to avoid injury to important structures, but, as in most cases the affection is unilateral in the early stages, this incision would not be applicable. Although recommended by some writers, it is inadvisable to make an incision in the mouth below the tongue on account of the difficulty in establishing drainage. Where there is mechanical interference in the breathing from edema glottidis, Cheyne and Burghard recommend intubation, but it is difficult to

see how this can be accomplished owing to the patient's inability to open his mouth, and the obstruction caused by the elevated tongue. The disadvantage of tracheotomy is that it is almost impossible to prevent infection of the tracheotomy wound, but in some cases it is the only possible course to adopt. If the condition be due to a streptococcus invasion, antistreptococcus serum may be of some assistance, and, of course, suitable treatment must be resorted to for the various complications as they arise.

For the notes of this case, which I bring forward, I am indebted to Dr. A. M. M'Gregor, late house surgeon in the Western Infirmary.

A. S., aged 49, a traveler, was admitted to the Western Infirmary, June 10, 1905. Previous to this illness he had always enjoyed good health, and he was very temperate in his habits. On June 3 he complained of slight "sore throat," with pain in the right ear, but there was no discharge from the ear. Two days later a swelling appeared externally just behind the angle of the lower jaw on the right side, and, on account of the rapid increase in this swelling, he was admitted to the hospital.

When admitted he appeared to be very ill. The chin was tilted upwards and the head backwards by the swelling, which was very marked, and extended below the chin from the angle of the jaw on one side to the corresponding point on the other side, and downwards to below the level of the cricoid cartilage. The swelling was hard and brawny, except at a point just to the left of the middle line, where a sensation of deep fluctuation was obtained. The face was swollen with edema, and the mouth could only be opened about half an inch. A hard swelling could be made out in the floor of the mouth and pushing the tongue upwards. Swallowing of even liquid food was accomplished with difficulty, and there was a considerable degree of dyspnea from which the patient seemed to get some relief by resting in bed on his hands and knees. Nothing abnormal was made out in the lungs. The temperature was 100 degrees, and the pulse was 102 per minute, and slightly intermittent. As there was a story of his having coughed up a cast of the trachea a few days previously, a swab was taken from the throat and examined for bacillus diphtheriæ, but with a negative result.

In order to make the necessary free incisions in the neck, chloro-

form was administered. The patient struggled during the administration and then stopped breathing. As artificial respiration was of no avail, tracheotomy was performed as low down in the neck as possible. The wound was very deep on account of the edema and infiltration of the parts, and, on introducing the tube into the trachea, at least half an ounce of fetid pus was coughed up, and finally respiration was reestablished.

Free incisions were made into the brawny area, and a little pus was found, but all the cellular tissue surrounding the muscles and the salivary glands was in a black, sloughing condition. For some days the patient continued to cough up pus through the tracheotomy tube, which was removed on June 16. A large number of sloughs were discharged from all the wounds in the neck, including the tracheotomy wound. The patient's general condition improved, and he was able to breathe in comfort while lying on his back, and to swallow without difficulty. A parotid abscess, which developed on the left side, was opened, and another incision was made low down in the neck for drainage purposes. On June 19 there was severe hemorrhage from all the wounds in the neck owing to ulceration into the transverse cervical vein. In order to control this the large cavity in the neck was tightly packed with gauze, as a result of which within twenty-four hours the patient developed a severe attack of erysipelas of the face and scalp, but under suitable treatment this disappeared in a few days. The wounds in the neck healed rapidly by granulation, and he was dismissed cured on July 11.

The points to which I would draw attention are:

1. The inadvisability of giving a general anesthetic to a patient suffering from Ludwig's angina, as, owing to the patient's inability to open the mouth, it is impossible to say whether or not an abscess is pointing into the pharynx.

2. It was demonstrated at the time of operation, and for days afterwards, that a large quantity of pus had escaped into the trachea, and yet, although the chest was examined daily, no signs of pneumonia could be made out—in fact, there was hardly a râle to be heard in his chest from the beginning to the end of his illness.

3. Unfortunately, in this case no examination was made of the pus, either by culture or otherwise, to demonstrate the nature of the microorganism involved. In the literature of the subject it has

always been taken for granted that it has been a streptococcus invasion, and this is probably so far correct. It was noted, however, by Ludwig, and occasionally since his time, that in a few of the cases there was a distinct formation of gas in the tissues. This suggests the possibility that, in at least some of these cases, we have to deal with the bacillus of malignant edema, either alone or in combination with a streptococcus.—*British Journal Dental Science.*

LOCAL ANESTHESIA AND ANESTHETIC AS EMPLOYED IN DENTAL EXTRACTIONS, RHINOLOGICAL, AND MINOR OPERATIONS. By D. Lloyd Smith, M. B. Lond., M. R. C. S. Eng., and J. Taylor Hughes. It is with great diffidence that we add to the already large number of local anesthetics now in use for dental extractions and minor surgical operations. We have had such uniformly satisfactory results with the one we employ that it is with this view only that we wish to bring it to the notice of those interested in such work. For more than two years the investigation of this local anesthetic has been carried on and with many trials and errors before we obtained the desired results. The number of substances which have been found to possess more or less well-marked anesthetizing properties reaches some hundreds, and hence it is obvious that the action cannot have a different explanation in each case, but rather depends upon some general type of interaction between the anesthetic and the active part of the cell—that is, the cell protoplasm. Further, the action occurs not only with nerve cells, but with ciliated and other epithelial cells, with muscle cells of all types, with bacteria, ameba and other unicellular organisms, and with all types of vegetable cells in which activity is suited to experimental demonstrations. The anesthetic as originally made consisted of four solutions which were mixed at the time of operation, but latterly of two solutions. It must be distinctly understood that the quantities given below are for small quantities as originally prepared, although of late we have made much larger quantities. The final preparations decided upon and developed in the laboratory and the particulars given in the protected process are as follows:

Solution 1 consists of 0.3 per cent solution of cocain hydrochlorid in sodium sulphate (pure)—i. e., free from chlorids, etc.—this solution to be of a specific gravity from 1025 to 1029. A few

crystals of pure salicylic acid (not synthetic) as a preservative to the cocain solution are added to prevent development of mold. The most minute quantity of salicylic acid is sufficient for this purpose. This cocain-sodium-sulphate solution of specific gravity 1025 is put into accurately glass-stoppered bottles and retains its properties indefinitely, whether exposed to light or not. The reason for using sodium sulphate in preference to other neutral salts and of this specific gravity will be given later.

Solution 2 is the distilled liquor hamamelidis and not the British Pharmacopœia extractum hamamelidis liquidum. It was found that better results were obtained with the introduction of this substance, especially in dental work. Equal volumes of Solutions 1 and 2 are now placed in one bottle which we call X.

Solution 3 consists of serum albumin which is obtained from the whites of eggs (hens). Egg white is composed of serum globulin and serum albumin, the globulin being precipitated by half saturation with a solution of pure ammonium sulphate and filtered, the filtrate of serum albumin in ammonium sulphate coming through as a clear limpid liquid of a pale straw color and of a specific gravity of 1040-1050. It was found inadvisable to inject a liquid of this specific gravity into the tissues, so this solution of serum albumin is brought down to a specific gravity of 1030 by adding some sterilized water. By the addition of 0.5 cubic centimeter chloroform (pure) to 100 cubic centimeters of Solution 3 it keeps indefinitely. The chloroform has now been dispensed with and instead we use a crystal of thymol which floats on the surface of the liquid. We suggest that this Solution 3 should be filtered through a Pasteur-Chamberland or d'Arsonval filtering apparatus, either by pressure or into a vacuum; in this way it could be obtained sterile.

Solution 4 is the active principle of the suprarenal gland in solution 1 in 1000. At present, Solutions 1 and 2 together and 3 and 4 are supplied separately to be mixed as required in the same bottle. We call this X 2. This solution gives a deposit if kept exposed to the light, but when sterile and placed in amber-colored bottles, and kept away from the light, it keeps good for some time. Various salts and solutions have been used, but up to the present the sodium and ammonium sulphates have given the best results. They must be obtained chemically pure. They are neutral in

reaction and diffuse with rapidity into the various tissues injected, being isotonic with the various body fluids. Solutions of various specific gravities have been tried, some above 1045, with the idea of inducing pressure ischemia, but owing to the excessive interstitial pressure produced edema resulted, which took some time to disappear. The pain was not so completely abolished, but the hemorrhage was practically *nil;* in those cases where oral sepsis was very marked sore mouths resulted. After this solutions of specific gravity not above 1030 were employed, and with most satisfactory results from all points of view; this specific gravity is just above that of the blood plasma (from 1025 to 1028). The percentage of cocain in the sodium solution is about 0.3 per cent. The reason that pure sodium sulphate is used in preference to other salts is that it greatly enhances the penetrating power of the cocain by diffusing rapidly into the albuminous elements of the tissues. The anesthetic effects of this combination are equal to those of a 10 per cent solution not thus fortified. The danger of constitutional symptoms is thus lessened, and the use of this remedy attended with less expense, a fact worthy of consideration in institution practice. The serum albumin is added as being a natural constituent of the body fluids and hence isotonic with them, and approximately of the same specific gravity and very diffusible. We tried serum obtained from the ox and sheep, but had to give it up owing to the persistent hemorrhages. As said above, the sodium sulphate greatly increases the penetrative power of cocain, but the serum albumin delays its passage or absorption, or in other words, it lengthens out its anesthetizing properties.

It has been found by extensive trial that the local anesthetic should have a specific gravity of not higher than 1030 and not lower than 1025. The best results were obtained within these limits. Three syringefuls of 20 minims each can be injected with safety, and in this 60 minims only half a grain of cocain is given. With 40 minims from four to five teeth can be extracted without pain or hemorrhage. Roots can be elevated. The state of "bloodlessness" soon passes off and the socket fills up with blood, which coagulates and serves as a "plug." It must be remembered that a good deal of the solution when injected may be lost through faulty syringes or squirting of solution backwards along the track of the needle. It will be found unnecessary to wait, as one can

operate as soon after injection as one likes. If anesthesia of a moderate area is desired the diluent should be the serum albumin; it is unnecessary to increase the volumes of the other solutions. We have removed with this local anesthetic a sebaceous cyst of the size of an orange from the back of the neck. This took quite fifteen minutes to excise; the sites of the injection being around the base of the tumor. Also, we have undertaken the rectification of deflected septa, removal of inferior turbinates, nasal spurs, tonsils, ganglions, "opening abscesses," etc. The best method of injection one soon learns and acquires by practice. For teeth the needles should be inserted into the gum on the buccal and lingual surfaces if the interdental space does not allow of it. When the piston slips easily anesthesia will not be effective; it is always better to experience a little resistance when injecting, and it will be noticed that the surrounding gum becomes of a livid white color; as soon as this occurs extraction can be proceeded with without pain or hemorrhage. In removal of turbinates and tonsils longer needles should be used and plunged into these bodies.—*Lancet* (*Brit. Jnl. Dent. Science.*)

A LARGE RADICULAR ODONTOMA FROM THE MANDIBLE. By Mr. J. Bland-Sutton, F.R.C.S., London. The odontoma, the subject of this communication, was removed from a boy, aged 15, who was placed under my care in the Middlesex Hospital. This boy had been watched in the country for about a year, under the impression that he had a sarcoma growing in the mandible, and it had sadly distorted his face. When admitted there were widely divergent views expressed as to the nature of the swelling, but I felt very strongly that it was an odontoma, but no positive diagnosis was possible until Mr. Mann took an excellent skiagraph, which showed beyond any doubt that the enlargement was due to a hard tumor surrounding the roots of the second left lower molar and indicated that we had to deal with a radicular odontoma, for the crowns of all the teeth, except the third molar, were well above the gums.

I attempted to enucleate this tumor through the mouth, but soon realized that it could not be easily accomplished, so I incised the skin along the lower border of the body of the mandible, and exposed the tumor by chipping away the outer plate of the bone,

and then turned the mass out of its bed by means of a stout raspatory. On examining the bed in which the tumor had grown the unerupted third molar tooth was clearly detected. The boy quickly recovered.

The tumor is fairly globular, and encloses the roots of the tooth up to its neck. The interior of the odontoma is shown as it was broken by the raspatory in the course of removal, and the parts of the tooth embedded in this ossific ball, though quite distinct near its neck, shade off, and are indefinitely lost in the tissue of the tumor. The structure of the tumor is interesting because its ossification is incomplete. On examination immediately after removal it was easily seen that this apparently hard tumor had tracts of soft tissue running through it. Fragments were carefully decalcified, and presented under the microscope typical pictures of ossification proceeding in a membranous mesh. In the parts where the ossifying process was complete the bone resembled the loose and open texture of the alveolar processes of the jaw.

In classifying this tumor with radicular odontomes I follow consistently the definition of this species as set down in my book on "Tumors," which runs in this way: "This term is applied to odontomes which arise after the crown of the tooth has been completed, and while the roots are in the process of formation. As the crown of the tooth, when once formed, is unalterable it naturally follows that should the root develop an odontome, enamel cannot enter into its composition; the tumor would consist of dentin and cementum in varying proportions, these two tissues being the result of the activity of the papilla."

My principal object in framing this definition was to give the species an embryologic rather than a histologic basis; and the gross anatomy of this particular specimen shows how very intimately the tissues responsible for the formation of the roots of the tooth have been perverted to form a tumor. The observations are made here because it has been, and with very great plausibility, suggested to me that the tumor is in reality a cementoma. This is, of course, true from the histologic standpoint, but from a careful study of the subject I am convinced that for the present, at any rate, it will be convenient to keep odontomes distinctly connected with the roots of teeth under the special denomination radicular, and there are other specimens forthcoming which serve to show that they are

more complex than we have hitherto regarded them. The odontome, the subject of this communication, is interesting to me in another direction. In 1902, under the title of "An Anomalous Tumor of the Antrum," I described to this Society a tumor containing 500 fragments of bone, and expressed the opinion that it was an odontoma, although the crowns of the teeth were normal in number and position. The present specimen is of the same type of structure and clearly associated with the roots of a tooth, of which the crown is normal in shape and in its position in the dental arch. In both odontoma we have examples of these tumors in active process of growth and can study the formation of loose bone in a fibrous tissue matrix.—*British Journal Dental Science.*

SYPHILITIC LESIONS OF THE ORAL CAVITY. By J. A. Pelkey, D.D.S., Dallas, Texas. In presenting this paper on syphilitic manifestations of the mouth, I do so, not because it contains anything new, but with the hope that an early diagnosis will teach us to be more careful in sterilization, and prevent the evil results from infection of this loathsome disease.

In defining syphilis it is given as an infectious, contagious and inoculable disease, transmissible also by heredity, communicated by coition, or by contact of parts that are only lined with a thin epidermis. It first manifests itself by an indurated or infecting chancre, followed by general lymphatic enlargement, afterwards by eruptions of the skin, usually symmetrical and at first superficial, and by allied conditions of the mucous membrane, later by chronic inflammation and infiltration of the cellulo-vascular tissue, bones and periosteum, and finally by a special production in the form of small swellings, which may invade any tissue or organ of the body.

The first period of primary incubation, or that intervening between the exposure to contagion and the appearance of the chancre is usually from three to six weeks. The initial lesion or chancre located in the oral cavity or other soft tissues of the body, always appears at the point of inoculation. It begins sometimes by a superficial papule, which generally extends in circumference and depth, sometimes by excoriation or a superficial fissure.

Upon the mucous membrane a superficial abrasion, or an ulceration covered by a grayish or yellowish false membrane with in-

duration giving the sensation of a hard nodule, which may be fibrous or cartilaginous. Ulceration, when it exists, is a simple cup-shaped depression. Its surface is smooth, and in the center a false membrane, beneath which is a raw vascular layer, bleeding readily. The induration may be superficial or deep.

The primary sore or chancre of the oral cavity is a consequence of direct infection from a syphilitic lesion upon another person, or may be transmitted by anything which has been in contact with a syphilitic sore.

In the diagnosis of labial chancre from other sores of the lips, we have a history of exposure to syphilitic inoculation; occurs at any age; no difference between sex; patient is often strong and robust; it is painless and regular in outline; smooth surface, elevated, indurated and sharply circumscribed base; scanty, odorless discharge; sore develops from three to six weeks; followed by submaxillary enlargement; heals or disappears under mercurial treatment.

The primary lesion of syphilis is less common on the tongue than on the lips. The chancre may appear on the anterior half of the organ, on the dorsal surface, the sides, or the tip. The chancre appears as a circumscribed nodule, and commonly assumes the erosive form. There is simply a painless, oval, or rounded superficial lesion, with smooth surface, covered by a grayish pseudo-membrane seated upon a parchment-like induration, and often as large as a dime, with glandular enlargement.

The ulcerative form exhibits a deep lesion, with sloping edges and well-marked induration.

Chancre of the tongue and fauces is rare in these regions, and when present is almost impossible to diagnose, because of the highly inflamed condition. The lesion presents the appearance of mucus patches, circumscribed or diffused, which is single, surface red, eroded, and covered with a milky looking membrane. The glands are enlarged, and the patient experiences difficulty in speaking and swallowing. When ulceration takes place the surface is granulated in appearance, of a grayish color, and is covered with inspissated mucus.

Chancre of the gum and hard-palate is very rare, and when present is hypertrophied, eroded, causes little trouble, and attended with little pain.

The local treatment of chancre, if the lesion is simple in nature, by burning with acids or other caustics, will not destroy it, but transforms it into an inflammatory nodule. The chancre should be kept clean by washing with sublimate solution (1-2,000) or dilute solution of carbolic acid applied every three or four hours.

Chancres covered with false membrane, thick or thin, and those which show a tendency to become necrotic upon their surface, should be cauterized with carbolic acid or pure nitric acid. Calomel as a dry dressing very often acts promptly. After cauterizing antiseptic remedies should be applied in the powder form, such as aristol, europhen, antinosine, nesophen, iodoform, etc. These remedies prevent ulceration and hasten the cure. After a healthy surface has been produced, the chancre should be treated with mercurial ointment.

The prognosis of a chancre is good locally. Constitutional syphilis follows in the majority of cases. Chancre of the tongue or of the fauces through interference of mastication or deglutition causes great debility.

The period of secondary incubation, or the period between the appearance of the chancre and development of secondary lesions varies from two weeks to six months, and is known as constitutional manifestation, of which the most morbid symptom is alteration of the blood, general lymphatic enlargement, moderate fever, temperature 100 to 101 degrees in the evening, neuralgia, muscular and articular pains, insomnia, alopecia, eruption of the skin and mucous membrane, with loss of appetite.

Eruption of the mucous membrane of the mouth is one of the most constant symptoms of constitutional syphilis, and it often occurs even before skin eruption. It may appear in the tonsils and pharynx, more commonly as mucous patches on the tongue and buccal mucous membrane. They appear whitish, irregular shaped, not elevated, and resemble a surface that has been touched with nitrate of silver. The mucous patches, if eroded, have a surface which is red and smooth, often the superficial epithelium desquamates and an ulcer is formed.

In syphilitic inflammation of the mucous membrane of the mouth, a general swelling of the gums takes place, with everted and ulcerated margins, exposing the necks of the teeth, although not affecting, to any degree, their stability. There is a viscid dis-

charge mixed with blood from about the necks of the teeth. Soreness renders mastication painful, and the affection may spread until the bone is exposed, exfoliating a portion of it.

In the treatment of secondary syphilis, mercury should always be given, the teeth put in perfect order, and kept clean by mild astringents and antiseptic powders. The mucous patches may be touched with nitrate of silver, thirty grains to the ounce of water. Applications of chromic acid, bichlorid of mercury, tannin, etc., are useful.

Boric acid, listerine, phenol-sodique, borax, chlorate of potassium may be used as antiseptic mouth washes.

When syphilis does not become extinct in the secondary stage it passes into a chronic condition known as tertiary syphilis.

The lesions are of deep development, and attack the subdermal and submucous connective tissues, also the internal parts of the body. These manifestations appear about the fourth year after infection.

Gummata are later lesions and when affecting the third and fifth pair of nerves appear as opalescent patches, with a slight thickening of the membrane, giving rise to neuralgic pains along the course of the nerves. Should ptosis or strabismus develop suddenly in an adult it is diagnostic of syphilis.

Gummata of the tongue are found in the mucous or muscular tissues. They begin as superficial lesions or small nodules, soon soften and ulcerate, leaving an excavation and covered by a false membrane of a yellowish-white color.

The deep gummata develop in the muscular tissue, taking their origin in the connective tissue. They begin as small tumors, break down, leaving deep ulcers.

Gummata of the soft palate give rise to symptoms of slight, uneasy or tickling sensations in the fauces, and the patient experiences difficulty in deglutition. Liquids may regurgitate through the nostrils, and the voice become impaired. The ulcer may expand and deepen, involving the periosteum or the hard palate, causing a perforation.

The treatment for tertiary syphilis is iodides and mercury; bromides may also be given for the nerves. Where a large opening has been made from the roof of the mouth into the nose, speech may be restored by making a plate.

Hereditary syphilis is transmitted to the child by one or both of the parents. It differs from the acquired disease in being constitutional from the first, there being no primary stage or chancre.

In the newborn mucous patches may appear in the corners of the mouth, and become converted into painful bleeding fissures, which on healing leave permanent scars. The mucous lining of the tongue and throat is covered by a grayish necrotic membrane. Dental erosions appear more frequently in the second dentition than the first, and may be found on any surface of a tooth. These erosions may show manifestations on the front of an incisor, such as cupping of a dark tint, grayish, brownish or almost black. The incisors may show the furrowed erosions, which are the most common, angular notches, serrations, atrophic thinning, normal base from which emerges a small, rough, dirty gray stump.

The upper central incisors when showing the crescent-shaped erosion, characterized by a semilunar notch in the free edge of the tooth, rounded angles, and narrow, are known as the Hutchinson teeth. The lateral incisors are usually dwarfed. The cuspids notched or atrophied. The first molar is the only one of the grinders showing hereditary syphilis. Two-thirds of its height is normal, its upper surface is atrophied, rough, and of dirty yellow or brownish tint.

The treatment in hereditary syphilis is the same as in the acquired case. The child should be given mercury, the system built up with codliver oil and iron, the mucous patches treated with mild astringents and antiseptic washes, the teeth thoroughly cleaned and all erosions filled.—*Texas Dental Journal.*

Clinical Digests.

A METHOD OF ATTACHING TEETH TO GOLD OR ALUMINUM WITHOUT SHOWING ANY VULCANITE ON THE LINGUAL SURFACE. By W. Cecil Trotter, B.A., D.D.S., Toronto. The large, unsightly area of vulcanite exposed on the lingual surface and heels of artificial dentures made on a metal base has always been very objectionable. The only way to avoid this in the past has been to discard vulcanite and to solder the tooth to the plate instead, an operation which few dentists had the courage to attempt on account of the time and material

consumed, and the risk of checking the teeth. Then when the denture was completed it was liable to become very disagreeable and foul, owing to the leakage of fluids of the mouth into crevices between and around the teeth. The usual result can be accomplished with very little trouble without soldering the teeth, and at the same time produce a stronger and more sanitary denture. The method is as follows:

Take an impression of the mouth, preferably in plaster, and pour with low-fusing alloy before it dries out and changes shape. The alloy which I find most satisfactory for this purpose is the Olivian Alloy which is supplied with the plate-swager of the same

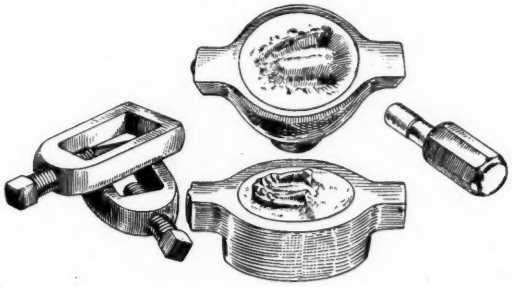

FIG. 1.

name. It melts below the boiling point of water and therefore does not generate steam when poured into a moist impression, and makes a very accurate die. After softening the impression compound in the lower half of the swager with heat, imbed the metal die in it so as to have the depth of the alveolar ridge above the level of the rim of the swager, as in Fig. 1. A piece of thin aluminum or gold (gauge 35-37) is now swaged to accurately fit the die by means of the flexible counter die material in the upper half of the machine. (Fig. 2.) Forty minutes from the time of taking the impression will usually accomplish this. It is a very simple matter at this stage of the process to insert a wire rim or margin all around the rim of the plate by simply allowing a flange of the gold or aluminum to project around about the plate line and swage a piece of wire to fit the plate line; then double back the extending flange of the metal so as to closely enclose the wire rim, taking precautions to leave a sharp, jagged

edge at intervals around the plate for the retention of the vulcanite.

After having tried in the mouth and taken an articulation, wax up the teeth on the metal base plate in the usual way and then

FIG. 2.

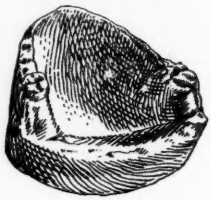

FIG. 3.

invest with plaster in the lower half of a vulcanized flask, and with a piece of soft plaster take an impression of the lingual surface of the plate and teeth. Pour the impression with the low-fusing metal, and upon the metal cast thus obtained (Fig. 3) swage another piece of thin gold or aluminum by means of the swaging machine, as in Fig. 4.

Now fit the second piece of metal into its place on the top of the first piece in the lower half of the flask, in such a manner, if possible, as to have the margins sit beneath shoulder of teeth.

FIG. 4.

FIG. 5.

Pour the upper half of the flask and separate. The teeth with the second piece of metal will pull over with the plaster in the upper half of the flask. Remove all wax, and if aluminum is used score and prick the contiguous surface of the two pieces of aluminum so as to afford firm attachment for the vulcanite. If gold is used the two pieces may be removed from the flask and soldered together with a very small amount of solder before packing

and vulcanizing. (Fig. 5.) When aluminum is used the precaution should be taken to pack pieces of pink rubber between the two layers of metal, so that when the flask is put in the press the the vulcanite will be squeezed through into every possible crevice that might exist between the two layers.

When complete the denture will present an entire metal surface over the whole of the lingual surface and heels, the only place where the vulcanite appears being the pink gums. This double layer denture is very little thicker than one made of a single layer, is much stronger and usually fits the mouth better, because it is always possible to swage a thin piece of metal more accurately than a thick piece. If modern methods of swaging are used in place of the old-fashioned, inaccurate, time-consuming way, it will not take more than an hour to an hour and a half longer to make this denture than to make one entirely of vulcanite, and the advantages when finished are certainly full compensation.—*Items of Interest.*

IMPRESSION AND DIES FOR ROOT CAP FOR CROWNS.

By Charles Channing Allen, D. D. S., Kansas City, Mo. In order to make a metal cap or matrix, necessary in building a porcelain crown for root, it is usual to take an impression in guttapercha and from the guttapercha impression, which is necessarily more or less imperfect, make a die of Richmond or other fusible metal. The die when made is inaccurate and clumsy. The whole method is slow and unsatisfactory.

After the top of the root is prepared, take a small stick of wood, pine preferred, about one-half inch square, whittle this down until it approximately fits the root to be crowned and slides easily between the abutting teeth, if there are any. Then drop sealing wax upon the pine stick, let the wax cool until it will no longer burn but is still soft enough to take an impression. Press firmly to place and hold till cold. You then have an excellent impression of the root of the tooth in intaglio, but, of course, in addition to that objection, a pine block does not make a good anvil. Now take your impression and oil it, then take the anvil block of your crown swager, melt the sealing wax upon it and press the pine block quickly and firmly to place, using no twisting or sliding motion. After cooling, these two sealing wax surfaces will separate, leaving

the perfect die wanted and upon an anvil ready for the swager. These operations can be completed in much less time than I have taken to tell it and are more accurate than any other. The metal cap may then be returned to the tooth for finishing.—*Dental Brief.*

AN EASY WAY TO REPAIR A BROKEN FACING. By Frank S. Osborne, D. D. S., Columbia, Tenn. The object of this paper is to give to the profession a method by which every one can repair broken facings in the shortest time and easiest way without a manufactured outfit.

By this method the strongest repair work is obtained, also an absolutely tight joint, and when finished a result which can scarcely be distinguished from the original facing. Select a suitable facing and with a pair of pliers bend the ends of the pins until they touch, forming a semicircle (Fig. 1), then with a small piece of 22 carat solder unite the ends by gradually warming up the facing over a Bunsen burner, held by a pair of pliers; smooth off all surplus solder. With a round bur drill a slot in the body of crown, using the pins of the broken facing as a guide to go by. This slot is to receive the semicircle made by soldering the pins.

Then try the facing in and grind it until a perfect joint is obtained. After the facing has been ground to fit, then with a small, round bur drill a hole from the lingual surface of the backing through the solder into the previously made slot (as you have a direct view you can see when the bur enters the slot), directing it to a fraction below the gingival border of the slot until you have a pit sufficient in depth to retain the pin that is later to take this position. Then select a gold or irido-platinum wire the size of the hole just drilled.

We are now ready to fasten the facing on. Mix some cement thin and fill the slot, then push the facing up and push the pin into position. After the cement has set, with a stone grind off the pin and burnish it well until a smooth surface is obtained. In a bicuspid crown or dummy the same method is followed, except that the hole is drilled from the occlusal surface instead of the lingual. In the bicuspid the pin may be cut shorter and some cohesive gold inserted over it.

The advantages of this method are that removal of the crown or bridge is not necessary. A direct view is had through the whole

operation, making it the easiest and simplest method. If the facing is ground to fit, an absolutely tight joint is secured, with the lingual surface unchanged or unroughened. The facing in appearance is as near the original as it is possible to make. By this method the greatest strength is obtained.—*Dental Brief.*

GOLD INLAYS. By Clarence H. Wright, D.D.S., Chicago. Prepare the cavity without undercuts, either cutting away or filling in with cement to avoid them. Do not, however, leave a saucer shaped cavity, but rather abrupt walls. Allow a fair degree of level to the margins, although they must not be rounded —i. e., beveled, yet sharply defined.

If a proximal cavity, have the base incline to slightly greater depth from the gingival border; or a slight groove running labio-lingually will suffice.

As a rule, in bicuspid or molar, if the cavity be of fair proportions, it will be wise to extend it over into fissure or sulcus on occlusal surface. This will increase the strength of the inlay very greatly by taking advantage of the hooking and dove-tailing principles, allowing the inlay to emerge upon the occlusal surface through a comparatively shallow and narrow channel, into a deeper and broader depression. Any depth of cavity, abruptness of walls or suddenness of depression may be permissible, providing we leave no undercuts.

Now, using a small, suitably shaped piece of air chamber metal as a cup, take an impression of the cavity and tooth with modeling compound, and in some cases a bite may be desirable. From this make a plaster model, and if a proximo-occlusal cavity, cut a slot on either side and break at a point between the cavity and the adjoining tooth. This gives us a model of tooth and cavity alone, and rids us of neighboring teeth. The parts of the model may be assembled for reference when desired.

If time permits I prefer to dry the model, then treat with very thin sandarac varnish, which is absorbed by the plaster and produces a very hard, sharply defined surface. Press the model of the tooth with cavity, into mouldine and from this make a fusible metal die.

For the matrix I prefer 34 gauge pure gold, burnishing and fitting to the die and then to the model, being careful to anneal

frequently, and allowing the matrix to come just flush with the margins.

I use 34-gauge gold because it is thin enough to submit to the most exquisite adaptation; may be forced quickly into deep and sudden depressions with little danger of puncturing, and is heavy enough to handle safely, and to allow the use of a fine file, and if by mistake it is filed or cut out excessively, the deficient edge may be placed on the anvil and burnished or rolled out with round end burnisher to meet the margin.

We expect our compound impression to be very inaccurate and consequently our matrix must be perfected in the mouth. See that the cavity is free from any foreign particle, and also absorb the mass of saliva. Anneal and burnish thoroughly to the cavity, holding the matrix firmly with one burnisher and burnish with another. It is most important to anneal frequently during this procedure, and, above all, see that the matrix fully covers the margins, but yet with as little excess as possible.

After thorough burnishing anneal again, insert in the cavity and swage with a piece of vulcanite rubber, using a piece that well fills the cavity and covers the margins. Using considerable force in swaging with finger or broad instrument. If a proximo-occlusal cavity swage with broad, heavy spatula between the teeth and finger on occlusal surface. If, upon withdrawing the rubber, the matrix is dislodged, there is a possibility of its having been distorted. You will see the outline of the matrix is marked on the rubber. Trim off the overflow of rubber, re-anneal, adjust and swage again, and the matrix will be found to remain in place.

Gently dislodge and invest, and immediately pack a little dry plaster around the soft investment to absorb the excess of water and thereby lessen shrinkage and prevent breaking. When the investment has partially set, trim with a knife blade, so that the surface of the matrix will be exposed, and clean to the margin.

There are numerous ways of building up and contouring the inlay, which cannot now be entered into, but the following method is one that I now use in a great majority of cases:

Take Watt's crystal gold and platinum, tear off large pieces, anneal, and with broad foot plugger, press gently to place in the invested matrix, but do not condense to any extent, not more than would enable you to readily squeeze the mass out of

shape with the fingers. When built to about the required contour it may be placed in the cavity in the plaster model, with the parts assembled to guide in securing accurate contact. Now remove the platinum and gold, saturate with liquid flux, place on the soldering block in an inverted position.

Flow pieces of 22-k. solder on this inverse surface until the mass is nearly saturated. This structure will absorb the solder and still maintain its approximate contour, and also impart a most pleasing color to the finished inlay. Place it now in position in the matrix (which has received a coating of flux, applied with a camelshair brush), distribute pieces of solder around margins and wherever needed to completely saturate the mass. Flowing the solder on both sides of this porous material will generally preclude the formation of pits or bubbles. Any deficiency or flaw may be remedied by adapting a piece of gold and platinum to the imperfect part, apply the flame, and the solder will promptly fill the porous mass. Place in acid for cleansing and roughly dress the inlay with coarse wheels in the engine, being careful to grind very little about the margins.

The under surface should be roughened or have some concavity or grooves. If the inlay is of fair proportions, it is my habit to grind a concave space or slot, using a thin carborundum wheel, and deepening and roughening this space with a bur. In some cases, as, for example, the large deep ones in the occluding surfaces of molars, simple slots, filed on the sides, will suffice for retention. After grinding or cutting such slots or depressions it is well to grind or burnish the edges toward the depression in order to remove any particle of metal which may have spread in the cutting.

The inlay is now ready for insertion. If the cavity is in an obscure position, attach the inlay to the end of a round burnisher with sticky wax for convenience in handling. Dry the cavity, mix the cement thoroughly, place in the cavity, coating all parts of the surface and press the inlay in place with considerable force. When the cement has set the polishing may be completed.

It is my custom in all large cases where these details are employed to prepare the cavity, take the impression and dismiss the patient. Then at the next visit perfect the adaptation of the matrix and complete the inlay; or even it may be desirable to have the patient make a third appointment.

Many times two inlays or other work can be constructed at the same time. It is very satisfactory to have this kind of work in the laboratory, to be taken up at odd moments and left at any stage; and you can in this way spend many an hour most profitably, which otherwise might be lost.

In this work the following points should be kept in mind:

Bevel your margins, but do not round them. In obscure parts see that the matrix shows that it fully covers the margin. Burnish the margins vigorously, and the finest scratch will be filled by the gold matrix. As a general rule, in using the blowpipe bring a fair-sized, forceful blaze gradually to bear upon the solder, causing it to fuse and diffuse evenly.

When ready to set the inlay be sure that not the slightest foreign particle is in the cavity or on the inlay. Flush out the cavity and wash the inlay with stiff, camelshair brush, and dry by dipping in alcohol and igniting. Mix vigorously the cement, but not too thick. In cases of considerable area have it not thicker than will drop from the end of the spatula. I would prefer exquisite margins with indifferent cement, to doubtful margins and perfect cement. In inserting use considerable well guarded force. —*The Bur.*

ADRENALIN CHLORID AS AN ADJUNCT TO COCAIN IN LOCAL ANESTHESIA. By W. Clyde Davis, M.D., D.D.S., Lincoln, Neb. I have used the combination of cocain and adrenalin in varying proportions and I find that the following prescription produces universally good results:

Cocain hydrochlorate, 1-6 grain.

Adrenalin chlorid solution, 1 drop.

Distilled extract witch hazel sufficient to fill syringe.

Inject as any local anesthetic.

When more cocain is used the adrenalin chlorid should be correspondingly increased. It is hardly necessary to advise any readers of the importance of sterilized needles, an aseptic field and the contra-indication for hypodermatic injections in close proximity to pus formations. If these be made, infection of tissue with pyogenic bacteria may result and we may then hear another report of cocain causing suppuration.—*Texas Dental Journal.*

The Dental Digest.

PUBLISHED THE LAST WEEK OF EVERY MONTH

At 2231 Prairie Avenue, Chicago,

Where All Communications Should be Addressed.

Editorial.

THE STUDENT PROBLEM.

One of the most difficult problems for all educational institutions is how to get desirable students, and avoid the admission of incompetent and undesirable ones. There is no one feature in our profession which so much needs the careful, thoughtful consideration which this subject demands, for the dentistry of the future will be what the young men who are now preparing themselves make it. It may be said that this is an old and hackneyed subject. Old, it is true, but we are far from the day when the last word upon a matter of such importance shall have been said.

Never was there a time when there was so much need of agitation and discussion of this all-important question, namely, the preparation of the student for his future life work. Never was there a greater need for those who can offer helpful suggestions as to ways and means of securing a broader and more liberally educated class. A great step in advance was taken a few years ago by the adoption of a higher standard of education for admission, namely, that the student must have had a high school education, or its equivalent, for admission. It was soon found, however, that this seeming safeguard did not preclude very incompetent students from being admitted. The trouble here came largely from the fact that scarcely two high schools in the country had the same standard; while some required a varied and extensive course, others were correspondingly meager, thus making a vast difference in the requirements demanded of students.

While this preliminary education is a very essential feature in the requirements for admission, there are others quite as important to take into consideration, for the applicant may have had much mental discipline and yet lack absolutely in the ability to acquire

manipulative skill or the force of character sufficient to command the respect and proper treatment from those he expects to serve. We have known of several instances where students, after having commenced a course in dentistry, have accepted the advice of their instructors and given up this calling for some other, having become satisfied that they could not, on account of some of their deficiencies, become competent dentists. If this policy were adopted by instructors generally it would prove of immense benefit to the future of the profession.

Since there is nothing more helpful than agitation of a subject, the editor gladly opens the columns of the DIGEST for a full and free discussion upon this most important matter. Whom shall we hear from first?

Notices.

CENTRAL MISSOURI DENTAL ASSOCIATION.

The third annual meeting of the Central Missouri Dental Association will be held in the Hoffman Bldg., Sedalia, Mo., November 20th, 1906.

P. H. BRAME, Cor. Secy., Windsor, Mo.

GRAND RAPIDS DENTAL SOCIETY.

At the meeting of the Grand Rapids Dental Society held October 11th, 1906, the following officers were eelcted: President, L. T. Owen; Vice-President, A. Dorland; Secretary, C. A. Burbridge; Treasurer, H. M. Moorman.

NORTHERN ILLINOIS DENTAL ASSOCIATION.

At the Northern Illinois Dental Association, held in Aurora, Oct. 18, 1906, the following officers were elected: President, C. L. Snyder, Freeport; Vice-President, A. S. Cheeseman, Joliet; Secretary, A. M. Harrison, Rockford; Treasurer, H. G. Logan, Aurora; Supervisor of Clinic, J. E. Harned, Rockford.

SOUTHWESTERN IOWA DENTAL SOCIETY.

The tenth annual meeting of the Southwestern Iowa Dental Society was held in Red Oak, Oct. 9 and 10, 1906, and the following officers were elected for the ensuing year: President, Geo. Brooks, Greenfield; Vice-President, F. H. Scranton, Corning; Secretary, R. T. Will, Red Oak; Treasurer, G. E. King, Villisca; Executive Committee, F. E. Stever, Creston; H. C. Barnhart, Corning, and F. S. Schroeder, Red Oak. The next meeting will be held at Corning.

COLORADO SPRINGS (COL.) DENTAL SOCIETY.

At the annual meeting and banquet of the Colorado Springs Dental Society, held Oct. 12, 1906, the following officers were elected: President, George Y. Wilson; Vice-President, Frank Gray; Secretary, A. DeBerry; Treasurer, G. Moorhouse.

KENTUCKY STATE BOARD OF DENTAL EXAMINERS.

The Kentucky State Board of Dental Examiners will hold a meeting for the examination of applicants the first Tuesday in December. Every applicant must be a graduate of a reputable dental college. For further information address the President of the Board.

J. RICHARD WALLACE, "The Masonic," Louisville, Ky.

FIRST DISTRICT (ILL.) DENTAL SOCIETY.

The next meeting of the First District Dental Society of Illinois will be held Tuesday and Wednesday, December 11th and 12th, 1906, at Monmouth, Ill.

The original dates set for this meeting were October 30th and 31st, but for certain reasons have been changed to the above.

H. W. MCMILLAN, Secy., Roseville, Ill.

OHIO STATE DENTAL SOCIETY.

The forty-first annual meeting of the Ohio State Dental Society will be held in Columbus, December 4th, 5th and 6th, 1906.

A program of varied and exceptional interest has been provided and we hope to even surpass the very successful meetings of recent years. The papers are of the best, the clinics numerous and instructive, the exhibits extensive and complete.

The membership of this society has nearly doubled in the last three years. If you are not a member and are eligible come and join, but—COME!

F. R. CHAPMAN, Secy., Columbus, Ohio.

LIVINGSTON DENTAL CLUB.

The following dentists of Livingston County, New York, have organized to form the Livingston Dental Club: E. R. Griswold, F. W. Kuhn, G. H. Cutler, Danville, N. Y.; J. W. Cowan, C. J. Fraley, Geneseo, N. Y.; M. C. Bradley, Avon, N. Y.; E. A. Clapp, Livonia, N. Y.; W. H. Povall, G. T. Moore, Mt. Morris, N. Y.; Wm. Gamble, Wayland, N. Y.

The object of the organization is to promote among the people through the medium of the public schools and press a better knowledge of the care of the oral cavity and the preservation of the teeth; and for the advancement and elevation of dentistry and a mutual improvement of its members.

Meetings are held quarterly with the different members of the club. J. W. Cowan was elected President; G. T. Moore, Secretary-Treasurer.

G. T. MOORE, Secy., Mount Morris, N. Y.

MIAMI VALLEY (OHIO) DENTAL SOCIETY.

At the meeting of the Miami Valley Dental Society held October 1st, 1906, at Dayton, Ohio, the following officers were elected for the ensuing year: President, H. A. Hubbard, Dayton, Ohio; Vice-President, G. S. Blanchard, Dayton, O.; Recording-Secretary, R. H. McAnnally, Dayton, O.; Corresponding Secretary, Edwin B. Tizzard, Dayton, Ohio; Treasurer, C. M. Saul.

HARTFORD (CONN.) DENTAL SOCIETY.

At the annual meeting of the Hartford (Connecticut) Dental Society, held October 8th, 1906, the following officers were elected: President, E. R. Whitford; Vice-President, E. H. Munger; Secretary, H. E. Snow; Treasurer, A. A. Hunt; Historian, J. Warren Harper; Librarian and Curator, James H. Kanes; Executive Committee, Charles W. Roberts, W. A. Damon, Walter D. Bray.

NEW JERSEY STATE BOARD OF REGISTRATION AND EXAMINATION IN DENTISTRY.

The New Jersey State Board of Registration and Examination in Dentistry will hold the semi-annual meeting in the State House at Trenton, N. J., beginning Monday, December 10th, at 9 a. m. promptly. Practical and theoretical work will be completed in the same place. Examination extending through the 10th, 11th, 12th and 13th. All applications must be in the hands of the secretary ten days prior to the meeting. For information apply to the secretary. CHARLES A. MEEKER, 29 Fulton St., Newark, N. J.

NORTHEASTERN DENTAL ASSOCIATION.

At the meeting of the Northeastern Dental Association, held in Boston, Mass., Oct. 20, 1906, the following officers were elected: President, Fred E. Maxfield, Bangor, Me.; 1st Vice-President, Edward B. Griffith, Bridgeport, Conn.; 2d Vice-President, Edward A. Stanley, New Bedford; Secretary, Edgar O. Kinsman, Cambridge; Assistant Secretary, Charles F. Kreppel, Jamaica Plain; Treasurer, Frederic T. Murlless, Jr., Windsor Locks, Conn.; Librarian, Charles H. Riggs, Hartford, Conn.; Editor, David Manson, Burlington, Conn.

KNOX COUNTY (ILL.) DENTAL SOCIETY.

At the annual meeting of the Knox County Dental Society, held at Galesburg, Ill., October 13th, 1906, the following officers were elected for the ensuing year: President, M. W. Olson, Galesburg; Vice-President, Jay Hammond, Galesburg; Secretary, W. C. Marks, Galesburg; Treasurer, A. C. Parr, Abingdon; Librarian, F. W. Wolf, Galesburg. Board of Censors, G. H. Smith, F. G. Gurley, F. W. Wolf. Membership Committee, C. L. Rork, G. H. Smith, W. J. Adams. Program Committee, F. C. Lander, W. E. Mabee and W. C. Marks.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

The ninth annual meeting of the Southern California Dental Association was held October 8th, 9th and 10th, 1906, at Santa Barbara, and the following officers elected for the ensuing year: President, W. H. Spinks, Los Angeles; First Vice-President, George A. White, Santa Barbara; Second Vice-President, N. B. Acheson, San Diego; Secretary, Charles M. Benbrook, Los Angeles; Treasurer, E. V. Rice, Azusa; Editor, Kate D. Buck, Los Angeles.

TRI-COUNTY (ILL.) DENTAL SOCIETY.

A meeting of the Tri-County Dental Society was held September 24th, 1906, at Freeport and the following officers were elected: President, F. M. Carl, Freeport; First Vice-President, J. R. Hybocker, Polo; Second Vice-President, J. W. Cormany, Mt. Carroll; Third Vice-President, S. R. Neidigh, Freeport; Secretary, W. T. Best, Freeport; Treasurer, R. B. Munn, Freeport; Librarian, E. H. Allen, Freeport; Board of Censors, F. H. Bowers, Freeport; F. S. Trickey, Freeport; W. E. Tucker, Lena. Program committee, E. L. Griffith, Freeport; E. H. Allen, Freeport; C. L. Snyder, Freeport. Membership committee, L. H. Matter, Freeport; H. C. Heyer, Freeport; S. R. Neidigh, Freeport.

LATEST DENTAL PATENTS.

829,027. Tooth-powder can, John E. Lee, Conshohocken, Pa.
829,119. Dental plugger, Frank X. Mellen, Triadelphia, Ohio.
829,395. Dental engine, Nathan K. Garhart, Indianapolis, Ind.
829,449. Tooth-brush, Wm. L. Whaley and H. L. Loring, Chicago, Illinois.
829,997. Manufacture of plates for artificial teeth, Arthur Ollendorff, Breslau, Germany.
830,852. Mechanism for cutting wooden toothpicks, John M. Rounds, Strong, Maine.
830,872. Amalgam carrier and plugger, Hugh W. Arthur, Pittsburg, Pa.
831,185. Vitreous cement for plugging teeth and manufacturing the same, Josef Rawitzer, Charlottenburg, Germany.
831,307. Dental tool, Charles A. Spahn, Newark, N. J.
831,391. Attachment for tooth-brushes, etc., James L. Ubellar, Kankakee, Ill.
831,489. Dental disk holder, Jacob A. Thomas, Hanover, Pa.

News Summary.

J. R. CARROLL, a dentist of Gurdon, Ark., died suddenly Oct. 17, 1906.

E. C. CHASE, 58 years old, a dentist of Hillsboro, Ill., died Oct. 16, 1906.

GEORGE P. FITZ, a retired dentist of Attleboro, Mass., died suddenly Sept. 28, 1906.

R. H PIERCE, a dentist of Duluth, Minn., was drowned in Rice Lake Oct. 11, 1906.

C. N. BOARDMAN, a dentist of Hurley, S. D., died Sept. 27, 1906, after a long illness.

DAVID S. ARNOLD, 45 years old, a dentist of Atlanta, Ga., died Sept. 27, 1906, from appendicitis.

GEORGE F. REESE, 68 years of age, a dentist of Brooklyn, N. Y., died Oct. 20, 1906, from heart disease.

WILLIAM B. PEARSON, 41 years old, a dentist of Anamosa, Ia., died at Colorado Springs, Col., Oct. 11, 1906.

J. C. GAHAGAN, formerly a dentist of Windom, Neb., died very suddenly at his home in North Platte, Sept. 28, 1906.

ARCHIBALD YOUNG GRAY, a dentist of Marine City, Mich., died at the home of his parents at Sarnia, Ont., of typhoid fever Oct. 1, 1906.

DANIEL B. FREEMAN, 64 years old, a dentist of Bethel, Vt., died Oct. 21, 1906, after a protracted illness. He practised dentistry in Chicago from 1867 to 1904.

TOOTHACHE.—Toothache due to pregnancy or debility should be treated with maximum doses of calcium hypophosphite.—*Medical Progress.*

FATALITY.—Oct. 26, a young woman of Sheboygan, Wis., died of lockjaw, caused by an abrasion of the gums from wearing an ill-fitting set of false teeth.

LUCKY DENTIST.—Dentist (prodding a patient's gum in search of a fragment of root)—"Funny I don't seem to feel it."

Patient (ironical in spite of the pain)—"You're in luck!"

STOPPING HICCOUGH.—A lump of sugar, moistened with vinegar, masticated rapidly and swallowed, will stop any hiccough, even the spasmodic hysterical form.—ARGELLIER, *Lyon Medical,* through *Repertoire,* 1906 (*Brit. Dent. Jnl.*).

FORMALIN.—Formalin, either in paste or fluid, should not be used in dressing teeth after the nerves have been recently devitalized. Severe pain and soreness is often caused by its use. It is indicated only in putrescent roots.—*Exchange.*

DAMAGE SUITS.—Sept. 26 a woman in Indianapolis, Ind., filed a suit for $500 damages against two local dentists for extracting the wrong molar.—A St. Paul woman is suing a dentist of that city for $3,025 damages for forcibly removing a gold crown from one of her teeth, after her refusing to pay for it.

DIFFICULT IMPRESSIONS.—It has been my custom for a number of years to use composition almost entirely for the taking of difficult impressions for lower partial plates. A composition impression is first taken in a cup which conforms as closely to the parts as will any ready-made cup. This impression is then poured with plaster as usual, and the resultant model used for the making of a special cup which will accurately fit the parts. Making die and counterdie from this model, copper plate No. 28 is swaged, then thickened and stiffened by the addition of pure tin flowed over the

reverse side with a soldering iron. A wire handle is then soldered on.—S. E. DAVENPORT, *International Dental Journal.*

ACCIDENTS.—Ernest Wing, a dentist of Boston, Mass., was so seriously burned while at work in his laboratory Sept. 29, that his life is despaired of. —Oct. 17, a young man of Richmond, Vt., swallowed three false teeth and the plate to which they were attached, necessitating an incision of the throat to remove them.

BACKING FOR FACINGS.—A very satisfactory backing for facings is obtained by using 1-1,000 platinum, doubled and burnished to the facing. Its advantages are: Adaptability to the facing, less likelihood of burning the backing while soldering, and reflection of color through facing.—HENRY C. LEE, *Dental Review.*

"PUNCHING" THE RUBBER DAM.—In a clinic given by Dr. G. D. Moyer before the National Dental Association, the rubber dam was first marked with blue pencil and the holes burned through the dam, an improvement on the ordinary punch, each hole being reinforced with a rim of melted rubber.—*Dental Cosmos.*

BANKRUPTS.—Hector Griswold, a dentist of Salt Lake City, Utah, filed a petition in bankruptcy, with liabilities at $3,210.20 and assets at $3,374. Of the last named sum $1,130 is exempt from execution.—Horace M. Withers, a dentist of Chicago, filed a petition in insolvency Oct. 11, with liabilities at $23,975 and assets $2,700.

TIN AS A FILLING MATERIAL.—Tin is a very poor conductor of temperature and in many cases it is advisable, and good practice, to partly fill an extremely sensitive tooth with tin. Half fill the cavity with tin and finish with amalgam or gold and there will be no suffering from thermal changes. —H. L. AMBLER, *Dental Cosmos.*

DIVORCES.—Mrs. Dora Anido filed a suit for divorce, Oct. 20, from her husband, Dr. Anido, a dentist of Dayton, O.—Mrs. Emerson Prettyman of Chicago was granted a divorce, Oct. 6, from her dentist husband, who is now practising dentistry in Brazil.—Dr. Edgar R. Riggs, a dentist of Sullivan, Ind., has filed a suit for divorce from his wife.

ILLEGAL PRACTITIONERS.—A man in Springfield, Mass., was fined $50 Oct. 6 for practising dentistry without a license.—Sept. 28, a man at Cripple Creek, Col., was sentenced to ten days in jail for practising dentistry without a license.—Oct. 6, a man at San Bernardino, Cal., was arrested for practising dentistry without a license. This is his second offense

PROSECUTING ILLEGAL PRACTITIONERS.—In matters pertaining to our own state, the county and local societies can most efficiently aid the State Board in enforcing our state law by securing competent testimony and other data when prosecution is determined upon. They can also secure the history of disreputable and illegal practitioners. It is also contemplated in our law that the local officials shall bring illegal practitioners into court. To get the officials to do their duty the local societies can and should be active in securing indictments when necessary, or

otherwise see that the proper proceedings are taken to enforce the law. The State Board stands ready at all times to do their whole duty, and will advise and assist in local matters when possible.—C. R. TAYLOR, *Dental Review.*

GLYCERIN AND ROSEWATER.—A bottle of glycerin diluted to half strength with rosewater should be kept on hand constantly to apply to the patient's lips before operating, as it overcomes any tendency to soreness. Smeared over the holes in rubber dam it facilitates passage between the teeth and is much less objectionable than soap or vaseline.—*Dental Review.*

TO PREPARE THE FLOOR OF THE CAP FOR A PORCELAIN CROWN.—Puncture the floor of the cap from the root side with a pointed three-cornered instrument. A puncture thus made turns up a bur on the porcelain side, which becomes firmly imbedded in the body of the piece and is fully as retentive as a headed pin in the facing.—L. A. ARNOLD, *Dental Review.*

TREATING CAVITIES WITH NITRATE OF SILVER.—I believe it is a good practice when you have some evidence of a superficial decay to touch it with nitrate of silver and see how deep it will go. In a few weeks that will show you how far the area of decay has gone. Lots of times you need not go any further, as that will stop the decay.—J. N. CROUSE, *Dental Review.*

FORMALDEHYD.—The 40 per cent. solution is far too strong for use in the mouth. Five per cent. is the strongest for dental use and 3 per cent. and 2 per cent. are enough in most cases. A drop or two or a 3 per cent. solution, placed in the canal of a putrid tooth, will, in two days, if sealed in properly, render it absolutely sterile and quite odorless.—B. J. T. BENNETTE, *Dental Record.*

SHAKY.—The dentist rubbed his hands and assured his new patient that his work could not be surpassed.

"What do you think of that crown I gave you some weeks ago?" said the dentist glibly. "Don't you agree it was the king of crowns?"

"No," replied the patient with grim humor, "I should call that the czar of crowns."

"And why, my dear man?"

"Because I am afraid I will lose it at any moment."

TEACH THE SHOPPER TO APPRECIATE YOUR SERVICES.—I had the following experience with a shopper (whom it is not necessary to describe): A short time ago he brought his wife for examination and wanted to know the exact price. The price was stated and then he wanted to know how much it would cost to fill the most decayed tooth. This information was given, and the man then informed me that he had no money and would come in again. I told him to come and also told him what my fee was for the consultation just ended. He was exceedingly amazed and a second hurried consultation was held, this time between the man and woman with the result that they concluded to have the work done. The treatment was begun at once, half of the fee collected and the patient instructed to return for completion of the work. Two days later

the patient kept her appointment and the work was completed and paid for in full. Moral: Charge for your examinations.—J. P. LEONARD, *Dental Review.*

LOOSENED TEETH.—Having secured immobility through prosthetic appliances, properly constructed, fumigate the gingivæ with sulphur as antiseptic treatment and give the gums a bath with extract of geranium, which constricts the muscular tissue surrounding the teeth, inducing the gums to tightly hug the cervical portion of the dental organs.—B. J. CIGRAND, *American Dental Journal.*

AVOIDANCE OF PAIN IN DENTAL OPERATIONS.—The wise dentist will not err on the side of undue economy in the use of burs. Burs should be so used as to bring the least pressure to bear upon the exposed dentinal fibrils in carious cavities. If the bur is as large as the orifice of the cavity pressure on the enclosed air will cause pain, quite absent if a smaller bur is first used.—WM. SIMMS, *Dental Record.*

BROKEN PIN IN ROOT-CANAL.—When a pin is broken flush with or below the root end, with a trephine, which will encircle the pin, cut out the cement around it. If the trephine will not reach to the end of the pin the new crown may be equipped with a tube of the same bore as the trephine, instead of a pin. A crown thus fitted is strong and can be cemented very satisfactorily.—THOS. J. MCLERNON, *Dental Hints.*

APPLICATION OF THE RUBBER DAM.—The application of the rubber dam will be easy and painless, or difficult and painful, in proportion as the septum of gum between the teeth is long or short. The careful application, by means of a very fine probe, of pure carbolic acid, or guaiacol, will be found to sufficiently anesthetize the gum to afford very comforting relief to the patient.—WM. SIMMS, *Dental Record.*

TO KEEP LATHE STONE WET AND CLEAN WHILE GRINDING.—Select a small egg-shaped sponge, commonly called "school sponges;" through the center of this pass an old excavator, having previously filed it to a sharp point at one end. Now tack a thin piece of soft pine, about four inches square, to the lathe table a little back of the stone. Wet the sponge and wring out just enough to prevent dripping; stick in the excavator and allow the sponge to recline against the wheel. When you stop grinding remove the sponge, as it will make a soft place on the wheel if left in position.—R. B. COLVIN, *Dental Brief.*

HOW TO TAKE A BITE THAT MUST BE CORRECT.—Nervous people are unable to close their teeth twice alike. If you wish to articulate a gold crown only it is hard to have the patient articulate correctly. In full dentures it is almost impossible to get the right bite, as most patients will throw their lower jaw forward.

My way of taking the bite is as follows: Put your patient in a comfortable position just as when you wish to converse with him. Prepare a trial plate in ordinary manner with a piece of warm wax upon it. At the heel of the plate put a clutch made of wax. Tell your patient to put the tip of the tongue within this clutch and close the lips. The patient

is unable to throw the lower jaw forward or sideways. The reason I have the lips closed is because, when a patient needs a full upper and lower set of artificial teeth there are no teeth in the jaws to close, and by closing the lips the patient is not so apt to protrude the lower jaw in case the tongue is lifted out of the clutch.—RICHARD KESSEL, *Items of Interest.*

IMMEDIATE ROOT FILLING A MISTAKE.—Most men who use cocain for the removal of pulps fill the canals at the same sitting. I never do that unless it is absolutely necessary, and then only under the most favorable circumstances. It is just as necessary to fill a root at a second sitting after the use of cocain as after the use of arsenic and for the same reasons.—F. B. NOYES, Chicago, Ill., *Tri-State Dental Record.*

NO DELETERIOUS EFFECTS WHERE CATAPHORESIS IS USED.—Time has proven that cataphoresis has no deleterious effect upon the pulp, providing too large a dosage has not been used, and with the aid of the ammeter the operator can tell just how much current is passing. The ammeter is just the same in cataphoric administration as the scales and graduates are in the dosage of medicine.—D. H. ZEIGLER, Cleveland, O., *Dentist's Magazine.*

HEMOPHILIA AND ITS TREATMENT (*Caledonian Medical Journal,* April, 1906.)—Lachlan Grant points out that when treating the local hemorrhages it is most important to avoid additional injuries to the tissues, such as may be produced by strong astringents or pressure pads. Though calcium chlorid is invaluable in hemophilia, it is advisable to intermit the use of this drug, as its constant use is not followed by a constant increase of coagulation.—G. GREY TURNER in *Treatment* (*Brit. Dent. Jnl.*).

ALVEOLAR ABSCESS.—Quite frequently after the formation of pus has been checked we have a weeping of serum from the canals. The following after five minutes, 182; after ten minutes, 95. and after fifteen minutes, 82.

℞. Eucalyptol 3j
Thymol .....gr.x
M.

—J. P. BUCKLEY, *Dental Cosmos.*

THYMOPHEN.—Equal parts by weight of crystallized carbolic acid and thymol crystals rubbed together in a mortar or combined by gentle heat in a beaker or porcelain dish results in a fluid of oily consistence similar in physical characteristics to the well-known camphophénique. It is without escarotic properties, does not coagulate the cuticle when applied topically, and has high germicidal efficiency. The peculiar value of thymol in the treatment of exposed pulps, even when superficially infected, is well known, and has been the subject of scientific study as well as of practical observation for several years. Solutions of thymol have not heretofore been of much utility in dental practice, owing to the lack of a suitable menstruum; hence the virtues of thymol as a root-canal dressing have not been as practically available as they should be. The combination here recommended, and which the writer has taken the liberty of designating

as thymophen, is an ideal medicament for use as a canal dressing, taking the place of camphophènique or the essential oils, because of its diffusibility, its sedative, non-irritant and superior germicidal properties. A large clinical use of the preparation is the writer's warrant for strongly recommending it to the dental profession.—EDWARD C. KIRK, Philadelphia, *Cosmos.*

ADULTS EAT TOO MUCH.—Dr. Osler, in "Counsels and Advice," says on this subject: "While temperance in the matter of alcoholic drinks is becoming characteristic of Americans, intemperance in the amount of food taken is almost the rule. Physicians are beginning to recognize that early degenerations, particularly of the arteries and the kidneys, leading to Bright's disease, which were formerly attributed to alcohol, are due in a large part to too much food."—MEDICAL TIMES (*Western Dental Journal*).

ROBBERIES.—J. E. Beardsley, Bridgeport, Conn., Sept. 22, $125 in gold.—W. M. Bourn, St. Joseph, Mo., Oct. 13, $20 in gold.—G. S. Burt, Springfield, Mass., Sept. 20, $10.—L. A. Cummings, Kansas City, Mo., Oct. 9, $25 worth of gold.—W. H. Hisey, Toledo, O., Oct. 17, $200 in gold leaf, teeth, plates, etc.—Dr. McCleery, Beatrice, Neb., Oct. 11, a quantity of gold.—Drs. Littlechild and Murphy, Fremont, Neb., Oct. 15, $50 worth of gold respectively.—National Dental Parlors, New Orleans, La., Oct. 6, $250 in gold, artificial teeth, etc.

AN IMPATIENT PATIENT.—

A patient knocked at a dentist's door,
Who had slept little the night before,
The pain was so great he was ready to roar,
The dentist compelled him to sit near the floor.
With drilling machine he commenced to bore,
Till the nerve was touched up, when, awfully sore,
The patient refused to stand any more.
It is sometimes unpleasant to tell the truth,
He lost that patient, but saved the tooth.

—*Dental Surgeon.*

PREPARING PLATINUM FOR THE MATRIX.—In using platinum as a material for matrices, it is well to have it of at least two thicknesses—one the commercial, which is supposed to be 1-2000 of an inch in thickness. This can be annealed and oiled and folded together, and with a good set of rolls can be reduced to probably one-half its thickness, and is much better for small inlays than the heavier gauge. Various methods for annealing have been suggested. One very good way is in the furnace, heating it up to 2,000 degrees or more, then allowing it to cool gradually. Another very excellent way is the oxyhydrogen blowpipe, which heats it very rapidly and very hot, and is more convenient on account of the saving of time, while the result is equally as good.

The platinum which has been doubled and passed through the rolls for the purpose of reducing the gauge is glazed on the surface which comes

in contact with the steel rollers, while the other side has a frosty or velvety surface. The frosted surface should be placed in contact with the tooth, the glazed side in contact with the porcelain, as it strips from the inlay more easily than the frosted side.—*Western Dental Journal.*

WHEN TIRED.—The idea that one never leaves the office is a little severe on our profession. I myself believe in leaving the office any day and any time I feel severely tired. I have done this for years, but notify my patients of intended absence. No matter who the appointment is with, I do not believe in my practice ruling me. My health comes first, consequently I do not believe in letting my patients dictate to me what I should do for myself. When we are able to do this, we will hold our own and become a dignified profession.—B. J. CIGRAND, *Cosmos.*

FEES FOR ADVICE.—Members of the dental profession need to understand better that patients applying to them for advice receive the benefit of professional knowledge and are benefited thereby. The dentist, however, too frequently, while doing his duty to his patient, fails to do his duty to himself. I believe the long period of free service in his consultation room should end and that people who are able to pay for that which they receive should pay the dentist for his advice quite as freely as they would pay the physician for his.—TRUMAN W. BROPHY, *Dental Review.*

POTASSIUM PERMANGANATE AS A HEMOSTATIC.—Schadel refers to the use of potassium permanganate as a valuable hemostatic agent. It should be employed in the form of a paste, made by mixing it with 4 per cent. of vaseline. The parts to which it is to be applied should first of all be thoroughly dried. It is of service in epistaxis, and in bleeding which results from the excision of warts and condylomata. Its application is only slightly painful. The preparation, when not in use, should be kept in an air-tight dish, as by exposure to air it deteriorates to some extent.—*Deutsche med. Wochenschrift* (*Brit. Dent. Jnl.*)

REPORT ON THE CONDITION OF SCHOOL CHILDREN'S TEETH.—Dr. Jessen of Strasburg, Germany, reports the astounding fact that out of a total of 100,000 school children from the different German states, from 81 to 99 per cent. were found to have diseased teeth, and that practically only 1 per cent. had normal healthy mouths. The examinations of the teeth of the school children of the city of Berlin showed, according to Dr. Ritter, that 90 per cent. had defective dentures. The city authorities of Mülhausen, having undertaken the examination of the teeth of the pupils of the elementary schools, found that 99½ per cent. had diseased teeth. From a total of 9,524 children examined, only 41 had sound dental organs, and only one pupil, who had recently returned from America, had an absolutely perfect denture. Following these alarming revelations, Mülhausen, inspired no doubt by the example of Strasburg, has established a city dental dispensary in which all children are treated free of cost. In addition, the cities of Ulm, Frieburg, Bielefeld, Leipzig, Zurich, and Frankfort are planning the erection of similar institutions; while Strasburg, Darm-

stadt and Offenbach have had public dental dispensaries in excellent running order for years past. In the public dental clinic of Strasburg 17,119 children were treated in 1902; 17,054 in 1903; 18,073 in 1904, and 17,241 in 1905. The expenses incident to the treatment of these children amounted to 2,300 marks in 1902; 2,750 marks in 1903; 5,430 marks in 1904, and 6,700 marks in 1905.—*Dental Cosmos.*

SELECTING SHADES.—When we are studying a tooth for the purpose of selecting shades, the patient should be in an upright position. I have noticed that if the patient is reclined so that the light strikes at an angle the teeth seem much lighter than they really are. This study should be made early in the operation before the teeth have been allowed to dry, as this always bleaches. In handling the shade guide we should remember that the body in an inlay will be much thinner than the specimen in the guide, and consequently much lighter, hence a darker color should be selected than is desired in the inlay.—J. O. WELLS, *Dental Review.*

BAKING WITH MICA DOOR FURNACES.—A simple but accurate method can be used for baking in mica-door furnaces. A soapstone wall is placed between the porcelain and the door and a one-quarter size gold cylinder is used to indicate the required temperature. The porcelain should receive the highest heat behind the wall, but the position of the gold varies, as if on a scale, between the side of the muffle and the end of the transverse wall. The gold is placed nearest the porcelain when a comparatively low temperature is sufficient, but the distance is gradually increased as higher temperatures are required.—C. M. BALDWIN, *Dental Review.*

EXAMINING BOARD AFFAIRS.—Dr. Starr Parsons has been appointed a member of the Board of Dental Examiners of the District of Columbia.—Dr. Wm. R. Marvell, of Fall River, has been appointed a member of the State Board of Dentistry of Massachusetts to succeed the late Dr. Dwight Clapp.—Dr. E. A. Honey of Kalamazoo has been appointed on the Michigan State Board of Dental Examiners to succeed Dr. Walter C. McKinney of Saginaw. —At the recent examination by the Michigan State Board eleven graduates were granted licenses to practice dentistry.—The governor of Pennsylvania announced the following appointments for the Board of Dental Examiners Sept. 24: H. B. McFadden, Philadelphia, and W. D. DeLong, Reading.

DIONIN. BY DR. F. WALTHER, LEIPSIG. [*Deutsche Zahnarztliche Wochenschrift,* Berlin, May 12, 1906.]—Dionin is the hydrochloric acid salt of mono-ethyl-ether of morphin. It is an odorless, white, crystalline powder of bitter taste, soluble in water. It is employed *per os* and also hypodermically. It is a substitute for morphin, possessing over the latter the advantage of inducing no unpleasant after-effects. Employed as a hypnotic it induces sleep which lasts from one to six hours. In adults it is administered in the powder form, in doses of from two to four centigrams (gr. ⅓-⅔), three to four times daily, or hypodermically in solutions of from one to eight per cent. For children it is given every three hours in teaspoonful doses, of a solution varying in strength from ½ gr.

to four ounces of water, to 1½ gr. to eight ounces of water, the latter dose being for children over four years of age.—*Dental Cosmos.*

FLUID FLUX THAT DOES NOT PIT.—

Powdered borax .....7 drachms
Powdered boracic acid, C. P.....7 drachms
Distilled cold water.....6 ounces

Put all in a pint bottle and shake well until all is dissolved; then filter and pour back until perfectly clear.—X. DODEL, *Dental Brief.*

TEMPERING WIRE.—Wire of German silver or other alloys is given its temper altogether by the method in which it is drawn down, and is not tempered by heating and cooling, as is steel. The reduction of very little each time for a large number of drawings will make the wire soft and very tough; the reduction of a considerable amount each time for a few drawings will make the wire very hard and brittle; the reduction of a medium amount for a few drawings gives a spring temper. Each metal must be handled in a different way, and the production of spring temper is by no means easy. Spring temper is lost by over-heating or over-bending, points which should be always remembered in handling appliances.—*Dental Register.*

SALIVA AND THE TEETH.—Dr. C. Risa has been able to confirm the views of other investigators to the effect that there is a distinct relationship between dental caries and the alkalinity of the saliva, and that a high alkaline reaction constitutes the best means of combating the development and progress of caries. From experiments on the means of modifying the saliva he finds that a diet consisting of foodstuffs rich in calcium salts increases the alkalinity and quantity of the saliva, and he believes that such a diet influences in a marked way the quality of the teeth.—*Lancet.*

METHOD OF MAKING AMALGAM DIES.—Amalgam dies have become very popular in the construction of gold and porcelain inlays, copes for crowns and for building up teeth that have decayed far below the gum margins with gold.

Take an impression with pink base-plate guttapercha in the following manner: Moisten the tooth and cavity with glycerin. Soften the guttapercha over an alcohol flame, being careful not to blister it, and force it into the cavity with a broad instrument. The glycerin will prevent the guttapercha from sticking in the cavity. Flow a stream of cold water over the guttapercha to harden; carefully remove and if the margins are perfect mix a small quantity of plaster, build it to a pyramid on a glass slab and invest the impression by forcing it down in the soft plaster with an instrument, being careful to have the plaster well up around the margins. When the plaster is hard mix the amalgam. I prefer to use alloy in the form of shavings, or copper amalgam. The latter is better, as it can be used several times over by warming it until the mercury appears on the surface when it is mixed thoroughly in a mortar. Carefully pack the amalgam around the impression until it is well covered

and then roll up a piece of unvulcanized rubber, about the size of a thimble, and wrap several thicknesses of rubber tape around this. Place it over the amalgam insert in a vise and squeeze out the excess mercury. Leave it under pressure three or four hours or over night. Then break away the plaster, remove the guttapercha and you will find a clean cut and polished die which is easily mounted in the swage and makes a perfect matrix.—C. J. Hadley, *Dental Register.*

Lead and Opium Wash.—The well-known lead and opium wash (*Journal American Medical Association*) has long been popular as an external wash, and justly so. A mucilaginous liquid could be used in the place of the tincture of opium without detriment, since it is the astringency of the lead which is desirable—the local application of the opium alkaloids being superfluous as they are not absorbed by the skin. The following mixture will probably answer the purpose for which the laudanum and lead-water are commonly used:

℞. Liq. plumbi subacetatis	gr. lxx;	
Mucil. acaciæ,	gr. xiv;	
Aquæ q. s. ad	℥iij.	M.

The solution of lead subacetate is diluted with 55 cc. of water and the mucilage with 27 cc.; the two are then mixed. Alcohol 15 cc. may be added to the water, but the amount of alcohol present in the mixture of laudanum and lead-water is too small to be of any benefit.—E. S. McKee, *Lancet-Clinic* (*Dental Cosmos.*)

Marriages.—Harry B. Bishopp, a dentist of Fairbury, Ill., was married to Miss Ethel M. Barnes of Fairbury, Sept. 26.—A. W. Black, a dentist of Frankfort, Ind., was married to Miss Mary Combs of Boulder, Col., Oct. 1. They will take up their residence in Boulder.—L. R. Eller, a dentist of Anita, Ia., was married to Miss Bessie McCoy of Washington, Sept. 12.—Charles R. Flatt, a dentist of Dwight, Ill., was married to Miss Pearl Bryning of Fulton, Oct. 23.—J. E. Hawthorn, a dentist of Rock Island, Ill., was married to Miss Anna Rea of Peoria, Oct. 10.—Carl S. Horner, a dentist of Connellsville, Pa., was married to Miss Lyda Oglevee of Vanderbilt, Oct. 10.—M. S. Joffe, a dentist of Brooklyn, N. Y., was married to Miss Anna L. Joffee of Chicago, Oct. 18.—J. M. McCullough, a dentist of Chicago, was married to Miss Mary Park of Pontiac, Oct. 12.—David McIntosh, a dentist of New York City, was married to Mrs. Wm. Brennan of Brockton, Mass., Sept. 20.—Evan W. Mentzer, a dentist of Reading, Pa., was married to Miss T. Belle Sheiner of Lebanon, Oct. 20.—M. F. Parmley, a dentist of Pontiac, Mich., was married to Miss Louise Hill of Pontiac, Oct. 5.—John S. Rule, a dentist of Hampton, Ia., was married to Miss Mary Raymond of Hampton, Oct. 11.—Ray Smith, a dentist of Zanesville, O., was married to Miss Helen Duvall of Zanesille, Oct. 16.—J. Pitt Tomlinson, a dentist of Lake Butler, Fla., was married to Miss Pet Wells of Worthington Springs, Oct. 10.—Earl E. Wilson, a dentist of Peoria, Ill., was married to Miss Vera Irwin of Rock Falls, Oct. 10.—Dr. Weart, a dentist of Dwight, Ill., was married to Miss Clara

Hills of Oswego, Oct. 10.—Claude Woolloms, a dentist of Whittier, Cal., was married to Miss Florence Nelson of Bartlesville, I. T., Sept. 19.

An Effective Ligature.—In cases where the clamp is objectionable for the retention of the rubber dam, and where the ordinary floss is not sufficiently bulky to prevent the rubber from drawing over it, a most admirable method of using the ligature is to first pass the floss through two pieces of rubber tubing, allowing one piece on the buccal and one on the lingual side of the tooth. This is much preferable to stringing beads on the ligature or using some other agents already suggested. The tubing should be the smallest size sold at the rubber stores, the kind used for slipping over the bows of glasses where they rest on the ears. To insure against leakage, drop a little sandarac varnish between the tubing and the enamel on buccal and lingual sides.—E. M. S. Fernandez, *Dental Review.*

Picric Acid in Dental Therapeutics.—Picric acid, which is also known under the names of carbazotic acid trinitro-phenol, and nitro-phenisic acid, has the formula $C_6H_2(NO_2)_3OH$, and may be readily prepared by adding coal tar creasote (impure carbolic acid) gradually to strong nitric acid and heating, when, on standing, the picric acid will crystallize. The salts of picric acid have been used in general medicine. The acid is soluble in alcohol, in ether, and in water (1 : 86), and has germicidal properties. Cheron, who has carefully studied the physiological action of picric acid, claims for it powerful healing properties, and has used it successfully in the treatment of ulcers. From investigations on the action of picric acid by Thierry and others, the conclusion may be drawn that it is an efficient germicide, acting through its coagulating power, and in addition by inducing keratogenesis. Upon wounds, picric acid soon induces a process of repair; the epidermal tissues proliferate abundantly, undergoing at the same time keratogenic changes, and wounds and ulcers promptly enter upon a process leading to complete cicatrization. Internally, picric acid is toxic, but properly diluted may be employed externally without fear of causing toxic phenomena. In the opinion of the author it is an excellent agent in the treatment of inflammatory affections of the mouth, for its action is both efficacious and rapid. He has successfully employed it in the treatment of traumatic glossitis, particularly those occurring through attacks of epilepsy; in exfoliative marginal glossitis, ulcerations of the gingival and buccal mucous membrane; in mercurial stomatitis, so-called, and, as a matter of fact, in all inflammations of the mucous membrane of the mouth, particularly those of microbic genesis.

The solution employed is as follows:

℞ Saturated aqueous solution of picric acid.....1 part
Distilled water .....2 parts

The solution is to be applied upon the ulcerated areas twice daily, by means of a wad of cotton. The picric acid treatment should not be made

to preclude the use of appropriate mouth washes at suitable times.—Dr. Ulysses Paranhos, *Revista Odontologica Paulista,* S. Paulo, Brazil. (*British Dent. Jnl.*)

Evils Incident to Use of Dam.—In the following operations the dam may be omitted for hygienic reasons, comfort of patient, economy of time, clearer view of the case, and for other advantages not here mentioned: (1) Opening tooth for ventilation of abscess, evacuation of pus, cleansing of chamber, canals, etc. (2) Removal of putrid matter or whatever should be removed from cavities or canals already exposed to the fluids of the mouth. (3) Cleaning of enamel and removal of filth and decalcified dentin—in short the greater part of the preparation of all cavities. In these cases a stream of tepid water cleanses the field of operation, dissolves or absorbs fetid and volatile matter, removing the whole to where it can no further offend and incidentally cleansing the mouth to the advantage of patient and operator. A self-filling syringe renders this use of water quite convenient. Where a dam is used the foul infectious poisonous contents of the cavity are evaporated by blasts of air and when cut to dust are puffed out to the immediate contamination of the air breathed by patient and operator. Filthy dust of this kind once raised is distributed to everything in the room. It is not easily removed and so remains a menace to the health of operator and patients. It would therefore seem well to avoid the dam and dust-blowing where it is not essential to correct work.—W. C. Gowan, *Dental Review.*

A Root-Canal Filling Material.—For some years I used guttapercha in its several forms, but in doubtful cases I used a filling that gave me such success that I employed it more and more, until now I rarely use anything else, except when I am going to use a pin, in which case I use guttapercha to close the foramen. This filling is a cement composed of zinc oxid and oil of cloves, and in cases of large foramen, abscesses, or any doubtful cases, I add some iodoform to the mixture. I would use the latter in all cases, for I believe it to be a valuable ingredient, if it were not for its objectionable odor, and for the slight soreness which it induces, which rarely occurs when the iodoform is absent. This cement is non-irritating, is easily introduced, does not clog in the canal, does not discolor, hardens sufficiently so that it will not absorb colors, is continuously antiseptic, and in case of trouble is easily removed. I have now been using it for several years almost exclusively, and for ten years in all doubtful cases, and while I have not always had success, in my hands it has given splendid satisfaction.

In using it I put a drop or two—according to the size of the canals—of the oil of cloves on a glass slab, then draw the powder into it, thoroughly incorporating the two ingredients to the consistence of a thick paste. I then pick up a small quantity of the paste with a canal-filler, place it at the entrance of the canal, and with a small pledget of cotton about the size of a pea, held in the pliers, force the

paste into the canal as far as possible. With root-canal fillers I work this to the end of the canal, adding some more of the paste, and repeating the operation until the canal is filled; but during the filling I often absorb all the oil of cloves that I can with bibulous paper pledgets. I find that thick, heavy oil of cloves works easier, makes a harder paste, and when set leaves the canals perfectly filled with a non-irritating antiseptic filling.—BUSH JONES, *Texas Dental Journal.*

ACOIN AS A LOCAL ANESTHETIC.—Acoin is a new chemical prepared from guanin, a leukomine resulting from the decomposition of guano.

It is a white amorphous powder, soluble in alcohol and to the extent of six per cent in pure cold water. Its reaction is neutral and it has strong antiseptic properties. A six per cent solution has strong caustic properties, and should not be used either internally or hypodermically.

The preparations of acoin should be kept in pure dark colored glass bottles, as alkalies precipitate the base. When kept in impure glass bottles the solution turns opalescent, caused by the traces of alkali from the impure glass entering into the solution, thereby causing precipitation. When kept in the dark there is no change in the solution for months.

This chemical was first manufactured and presented to the profession as a non-poisonous local anesthetic by the chemists of Germany.

My own experience in using acoin has been highly pleasing and successful. I have used it over one year in my daily practice, and, with the exception of one case, there has been no complaint of subsequent pain such as frequently follows after the extraction of teeth, whether either cocain or eucain have been injected.

When administered either internally or subcutaneously, its systemic action is somewhat similar to cocain, except that it is decidedly less poisonous, and still, at the same time, has a more powerful local anesthetic action.

This formula:

Acoin	gr. viii
Sodium Chlorid	gr. xll
Morphin Sulphate	gr. ss
Carbolic Acid	gr. iii
Glycerin	m. iii
Aqua Dis.	oz. iv

I have used in at least two hundred and fifty cases of extraction, and in no instance have I noticed any sloughing, while the anesthetic effect in all ordinary cases has been perfect.

In cases of badly abscessed teeth some patients complain of slight pain during the injection, but the removal of the tooth is painless, or nearly so.

In conclusion, I will say that I am so well pleased with the success I am having with acoin that I have discarded all others, and candidly believe that it is the coming local anesthetic.—DR. S. T. ADAMSON, *Western Dental Journal.*